System, Control and Sustainability

A concept of Control in the Local Environment System

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Declaration

This thesis is my original work and has been composed solely by myself

Wael Mohamed Ezzat Said Nabih

To my mother and father for whom this has been a dream for sometime,

Now maybe I can fulfil my own .....

Acknowledgement

In a few lines I would like to thank all those who supported and helped me in this long and tedious journey.

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Abstract

The formal characteristics of built environments are generated and governed by a range of forces. Most significant among these are political and economic forces typically extended on any settlement from outside. Various authors (Mumford, Lozano, Lange) have recognised this in the context of large cities but such forces are also imposed upon smaller settlements. This is in effect a disempowerment of people in local environments and settlements in requiring that they realise their ways, norms and customs towards centrally derived criteria. The author strongly believes that external forces risk swamping and even obliterating the development of diverse local knowledge and their consequent transformation into local ideologies, technology and built form.

This research is an attempt to form a theoretical understanding of a concept of control as seen in the local environment system. It defines forces and powers that shape local built environment. In so doing it tries to identify aspects and facets of this concept and attempts to establish a model that would explain it. This concept will help in gaining an understanding of the real forces shaping existing built form.

While recognising the existence of such powers, it is vital that the built environment is seen as a process and not an end product. To do so is to understand it as a system of transformation, and to recognise the different configurations of systems and how they transform the built environment accordingly. Only within the context of systems thinking can power be understood to operate as an inherent characteristic of any system, where the internal order of control differs. While the research recognises the existence of different configurations of local control seen in settlement form, it defines two that exist today varyingly. Those governed and controlled centrally by the state exemplified by modern state developments; and those that are organic have a local hierarchical system of decision making and an internal system of norms, exemplified by vernacular organic built environments.

It is also important to identify what define local control. The study proposes three functions of local control: local order system; economic activity; and knowledge and technology. These determine local parties and the powers they have to define the built environment. Observing these furthers an understanding of the concept and its internal mechanisms.

To observe the theoretical framework of the thesis, a comparative study in two settlements is conducted: one where the state defines form; the other where built form is locally defined. The three functions of control are observed in terms of parties and powers, and through indicators derived during the theoretical discussions. In order to assess the effects of local control it is applied against sustainability, used as a measurement of quality in the environment, because of its ability to provide a wide array of parameters and because of its international acceptance. A list of indicators relating to sustainability are compiled and set against those of control observing the practical implications. Sustainability becomes a method to evaluate the effects of local internal control as opposed to central state control. In formulating and then observing this concept it will be possible to develop better practical applications and solve recurrent problems. It may also enable decision-makers to readdress development be altering local control patterns.

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INTRODUCTION

INTRODUCTION

Inception of Research

The inception of any study is always directly influenced by the researcher's past and present experiences and views. This study is no different. Control as a research topic, is a very difficult one to isolate and identify as shall be seen within the course of the study. Its definition is subjective and differs depending on each individual's outlook. In order to define it within the course of this research it is first observed in popular definitions of the term and according to past thought and experiences of the author.

Control may have a number of varying definitions. In its most basic form it is the subjection of one entity to the will power of another (Oxford Dictionary 1986). This basic definition can be expanded to include many forms of control. There are some synonyms of control like ***power*** or ***force***, although none have precisely the same meaning. The term ***autonomy*** is of importance here because it can refer to a system that has an internal mechanism of control and delegation of power. Other related ideas are *self-reliance* and *self-sufficiency*. These reflect on the ability of a system to become internally controllable. To understand control within any context, we must identify *who* controls *what*, and *how*. There are therefore three parameters here. *Who*, relates to the identity of the party that controls. *What* relates to the artefact that is to be controlled. In this research this artefact is the built environment, and the systems that govern it or may have an affect on it. *How*, relates to the powers of control and the ways they will affect the artefact.

Organisational concepts of control and their definitions are very significant. It can be suggested that the most apparent of these concepts is government. Government, as a socio-political concept, is a central body that rules and governs the livelihood of a nation and within is an authority to change and shape many aspects that lie in its realm. The powers of this central body are further elaborated by observing their effects on the built environment in the body of this research. Government is a very important concept of control that operates at different structural tiers throughout the state, making it tangible and commonly associated with by people. It is a concept of *state control*. As such, different forms of state will define this concept differently. Communist states

generally form a government with stronger authority than might do socialist or free market states. All of these apply control and authority with differing levels of centralisation consequently depriving control locally. Local ability to maintain control is the focus of this research. But in order to observe local control as shall be done, the study must also define what is meant by the term *local*.

Another concept of control can be identified in the ability of economic forces to change our lives. Economy and economics are significant forces that affect the livelihoods of nations and more recently the effects of these forces were observed at a multi-national level (as with the economic crisis in South East Asia). Their ability to affect global regions belies their significant effects on localities as seen in labour migration from one location to another. The complicated powers of economics are manifested in migration tendencies resultant from economic crisis and can lead to the growth and decline of built environments, disrupting their very existence by controlling those who live in them. In such cases economics then becomes a controlling power.

Democracy is also a significant concept that regulates control. It is the power of the people to choose the way they are governed. The powers that were once centralised into government are once more decentralised to an individual level. However this power of control that is vested in the people is only that of choice as to whom should take decisions on one's behalf, and not power to actually take one's own decisions.

Freedom is often viewed to be lacking in modern society despite relative affluence that is found in democratic systems. Larger restrictions and rules are enforced in order to organise society to become a well working machine (Mumford 1963). An observation that can be made is that the legal framework, which regulates many aspects of how we live, represents a centralisation of powers of control non-existent before. The shaping of built form and how society lives in it occurred more freely before states imposed significant centralised controls. All of these and past concerns will be elaborated further during the course of the first chapter in relation to the built environment.

Research Orientation: Problematic / Evolutionary

Research studies are generally classified into two categories. One that starts with a problem or group of problems and attempts to understand that problem and find

potential solutions. The second is an evolutionary approach that attempts to gain an understanding of a certain phenomenon, sometimes by suggesting a model where various elements and their relationships to each other are better understood.

This research is oriented more towards the second category. It is an attempt to understand the built environment by understanding the internal and external powers that shape it. The reason for this approach is the researchers underlying objective to discover root causes for how built form was transformed rather than make an observation of the end product. At the same time, there is a need to find new solutions for many problems that relate to how we live today. These solutions must develop out of a real understanding of the mechanisms and powers that shape the built environment[1] including social, cultural, physical and political dimensions. This is to compare some environmental research to a doctor who has defined many symptoms in a patient but has not yet defined the root illness. In this sense the research is a problem solving one. Holistic ecological approaches that first attempt to gain a real understanding and then tackle core problems that we might face, require adoption. These are in contrast to more deterministic and reductionist approaches that attempt to follow individual threads of problem solving.

In this sense when the built environment is approached, core concerns must be defined holistically within all disciplines and not confined to a single discipline, even if it were in a study of built form. A focus on built form can be made later when relating it to these concerns observing how it may contribute to a change that improves how we live. Some basic concerns held by the researcher and that are often mentioned in environmental literature and studies are:

- Pollution;
- Crime;
- Over dependence on motorised transport;
- Unemployment;
- Depletion of energy resources;
- Over population and over crowding in some areas and depopulation in others;
- Depletion of natural environment and human contact with it;
- Loss of quality of life;
- Loss of family and community unity and values;
- Loss of intergenerational continuity and transformations of knowledge.

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[1] Built environment in this research is seen within the context of human ecology.

These concerns are all related to the built environment in one way or another and hence built form has the capability to make a contribution. The objective of the research is therefore to contribute to the solving of broad problems through architecture rather than to contribute to specifically technical architectural issues. This means that built form must be part of a comprehensive approach that identifies overall concerns, understands the complexity of our environment and the multitude of its components and thereafter become part of a comprehensive plan of action towards change and improvement. Such an approach is gaining support in the field of sustainable development, where the diverse nature of our environments and their internal complexities are recognised[1].

To adopt this approach, research must first gain an understanding of how human ecologies operate along with their internal mechanisms. This is one of the objectives of the research, and is achieved through analysis of the human ecological system in relation to built form using General Systems Theory (GST). However the main objective of the research is to observe the powers of control operate in this system and how they affect final form.

The study may therefore be seen as problematic. But based on: firstly an understanding of environment as a system; secondly, the formation of a new understanding of a concept of control and how it affects the local environment both internally and externally.

Objectives

The primary objective of this study is to develop a theoretical understanding of a concept of control in the local environment system. The study defines control seen in a number of ways. It identifies control in its ability to become an inherent quality in a local environment and settlement transformed through the local community. It may also be an external power that shapes the local system where local people do not have a role to play. In this case control is in the hands of the state. These are exemplified in organic vernacular settlements and their communities, and in contemporary settlements where the state plays the major role. The internal quality of control at the same time is affected by three functions of local control, which are; local order system, economic activity, and knowledge & technology. Each has the ability to increase or decrease local control by

[1] Sustainability is discussed in Chapter 2, p35.

defining a number of parties and their consequent powers of control. Parties and powers are the two basic parameters of local control and how it can be identified locally.

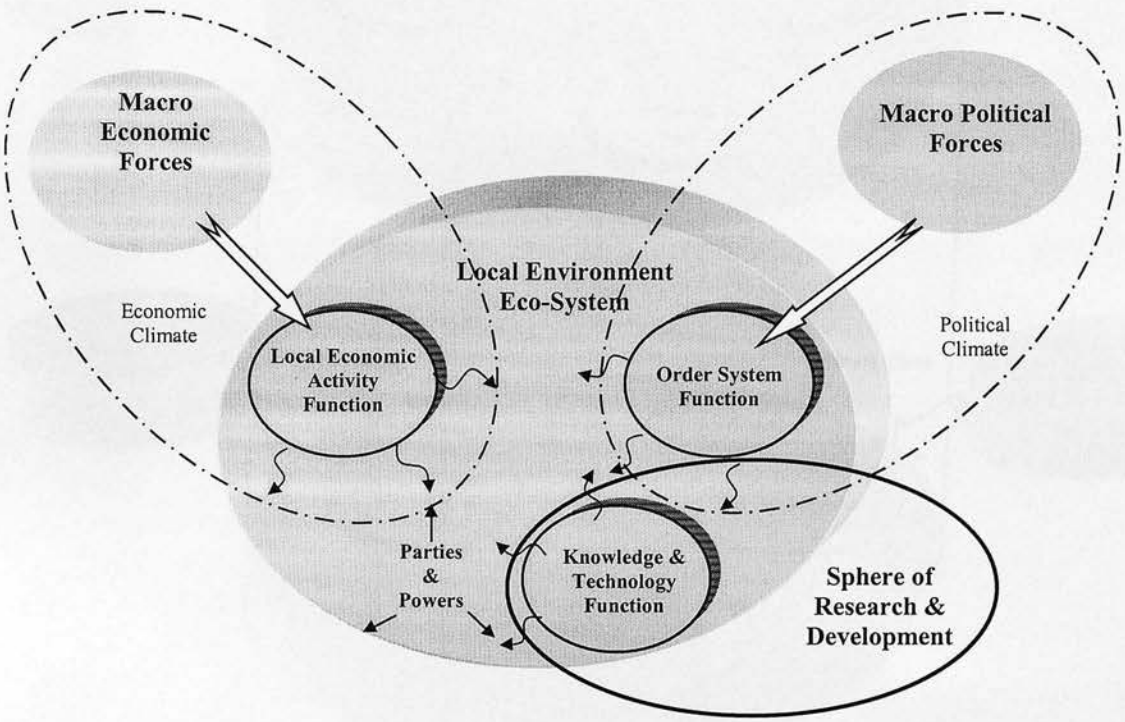

Figure 1 Theoretical Framework of Research

This framework of local control may be seen in different settlements and built environments. When observing a local environment that is state controlled the functions will differ and the identity of the local parties and their powers will change. The affects of these three functions will be seen during the course of the study.

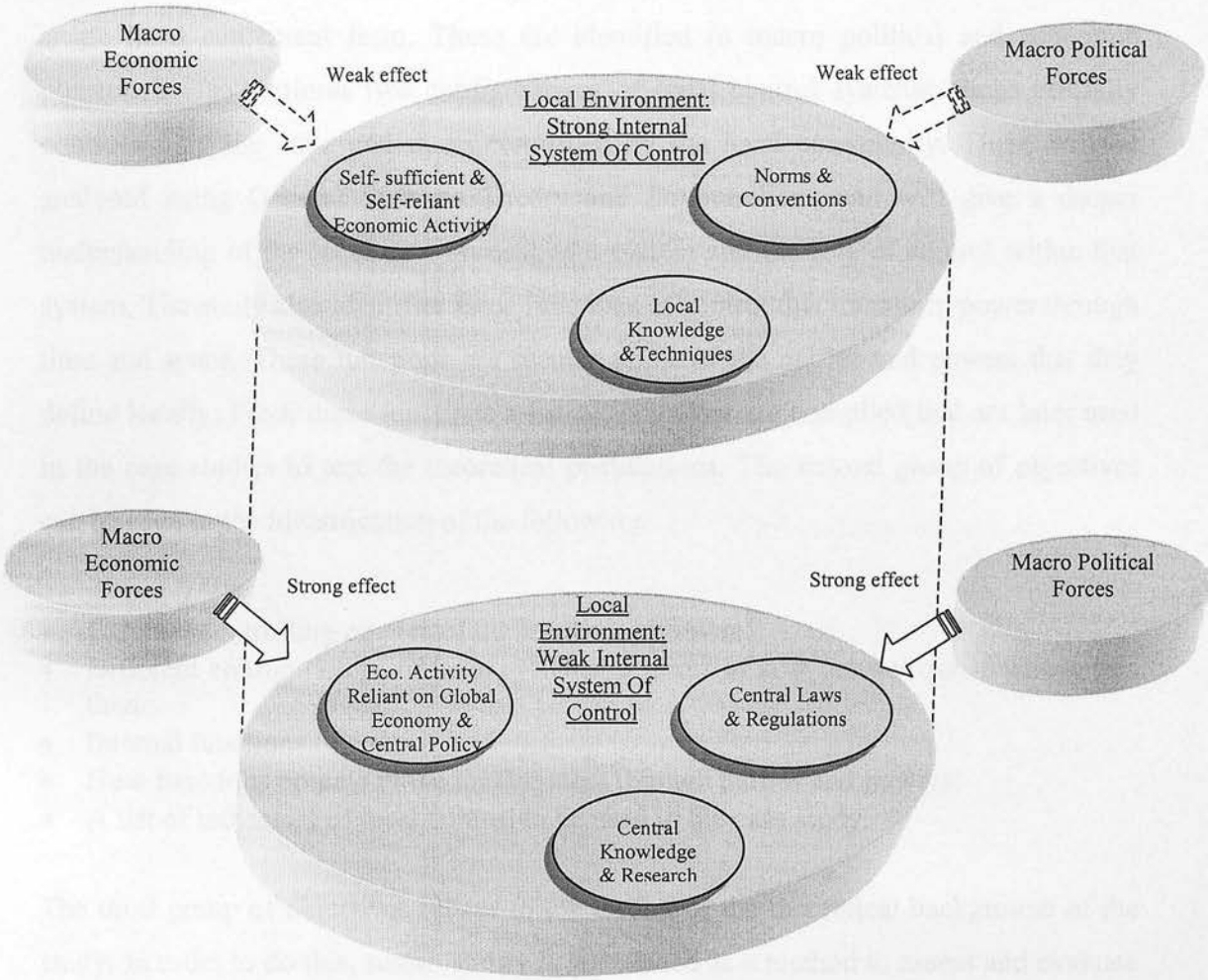

Figure 2 Functions of control that take in different forms in different local environment systems.

To achieve the main goals, the objectives of the research can be divided into three sections. The first identifies the background of the study and defines the local environment system in terms of its components. These are the natural physical environment, the man made physical environment or built environment, and those who inhabit the local environment seen in the local community. The first set of objectives can be seen in the following:

- To define the physical components and boundaries of the local environment.
- To define the term local community.

The second group of objectives relates to defining a concept of control in the local environment system as defined. It explores the external powers that have an ability to shape local settlement form. These are identified in macro political and economic powers. It also explores two configurations of local control systems; those centrally controlled by the state and those controlled by the local community. These will be analysed using General Systems Theory and Structuralism, and will give a deeper understanding of the local environment as a system and the role of control within that system. The study also identifies three functions of control that transform power through time and space. These functions are seen in terms of the parties and powers that they define locally. From these functions a list of indicators are compiled that are later used in the case studies to test the theoretical postulations. The second group of objectives can be seen in the identification of the following:

- External controlling powers of the local environment;
- Different configurations of local systems in terms of how control transforms within them;
- Internal functions of control;
- How functions operate in the local system through parties and powers;
- A list of indicators of local control to be used in the case study.

The third group of objectives relates to the testing of the theoretical background of the study. In order to do this, sustainability is introduced as a method to assess and evaluate a settlement. The use of sustainability in particular is because it provides a wide array of parameters that are holistic and cover many issues about our environment today. It is also used because of its international recognition and because it correlates with systems understanding of the environment and continuity. Through sustainability a number of indicators about the local environment will be compiled and used in the case study application. The study will apply both control and sustainability indicators in two comparative case studies where the relationship between them is recognised. The application of the case studies will enable an assessment of the positive and negative affects of local control on the quality of the environment. The third list of objectives can summarised as follows:

- Provide an overview of sustainability;
- Compile a number of indicators of local control and sustainability;
- Test both sets of indicators against each other in two case studies;
- Assess how different facets of control affect the local environment and built form qualitatively.

Research Methodology

The methodology of the research stems from its objectives. Its main goal is to explore a concept of control in the local environmental system. To do so it defines a range of facets of control pertaining to built form and the overall environment. In order to test this framework, the research applies it practically. Control indicators derived during the theoretical part of the thesis, are then applied in the case studies. They stem from the three functions of control that are introduced in the study. To these a number of indicators of sustainability are also introduced based on literature on the subject. The objective of using sustainability is that it acts as qualitative method of evaluation. Both sets of indicators are tested against each other in the final part of the research to evaluate how aspects of control have affected built form on a practical level. This evaluation takes into account social, cultural, physical, and environmental dimensions. Two case studies are chosen, located in the researchers' country of origin, Egypt. They both represent examples of places which reflect their environment; one having an internal system of control and perceived to be self-reliant and self-sufficient; and one that is apparently controlled from outside. Each case study also attempts to discover respondents' preferences in their built environment, their ability to control their surroundings and assess overall environmental quality.

Structure of Thesis

The thesis is structured to serve its objectives. It is divided into four parts (**Figure 3**). The first is the background of the study (Chapter 1), which provides an overview of the external powers that control the local environment system. It addresses how built form is affected by the political and economic forces of its time; defines the *local environment system* in the context of the thesis by identifying community and its physical environment. In addition it outlines the different processes that form the built environment and the different parties that control its transformation.

The second part of the thesis is the theoretical framework of the research. This is divided into two sections. The first of these addresses sustainability (Chapter 2), which is later used as a methodology to evaluate the quality of the local environment. This part is an overview of the literature on sustainability and a list of indicators to be used later in the case studies. The second section (Chapter 3) provides the core understanding of the local environment system in the research. This part attempts to analyse social

systems and their environments and how they operate to define their surroundings while observing the internal system of control that can be found. This analysis is done using General Systems Theory and Structuralism concepts. The chapter introduces the dimension of time in order to observe built form during the different phases that it undergoes within its' lifetime. The analysis compares different social systems and observes how communities can be self-regulatory in organising their livelihoods co-operatively. This is compared to centrally regulated systems, which rely on a framework of state rules and regulations in order to generate their internal organisation. Usually both these systems exist simultaneously within a local environment, but one is often predominant. The chapter concludes by introducing the three local functions of control that are discussed in the third part of the research.

The third part of the research introduces the three functions of control that are suggested and which are discussed in three successive chapters. In Chapter 4, *local order system* is introduced. It discusses how macro political forces and policies transform themselves into this function. Chapter 5 discusses how economic forces are transformed locally into local *economic activity*. The third function of local control that is introduced in the study is *knowledge and technology* (Chapter 6). This is basically self-reliance in terms of knowledge and technology and is seen as a function that originates from inside or outside the local environment. It is an indicator as to what extent people have the ability to form and use local methods and technologies that are best suited locally. The three functions introduced are all seen in terms of parties and powers focussing on the effects on built form. In these three chapters a list of indicators of control are derived from the discussions.

The fourth part of the research is concerned with the application and observation the theoretical framework practically. This is achieved by testing both sets of indicators against each other in the case studies. This is done in three stages, the first (Chapter 7) introduces the methodology for the case study and its objectives as well as a compilation of the indicators. The second (Chapter 8) is the survey results. And the third (Chapter 9) is the list of control and sustainability indicators as found in the case study locations and finally the conclusion.

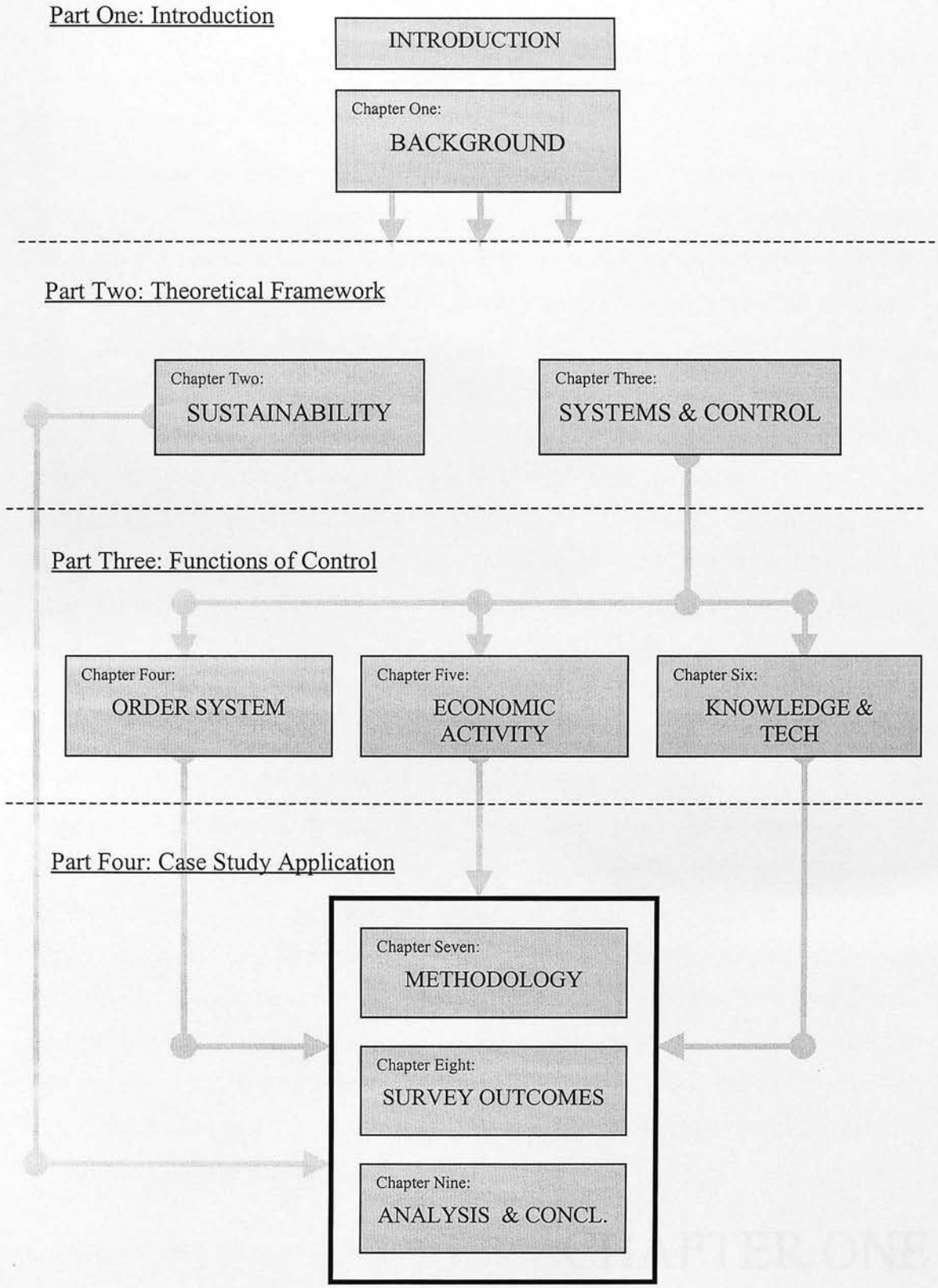

Figure 3 Research structure and organisation

CHAPTER ONE
Background

Background

1.1 Introduction

This chapter aims to lay down both the background of the research and define its main focus. The study being focussed on control, this chapter deals with urban form and relates it to the powers that give shape to it. Cities and urban forms in general have often been seen as the result of economic and political forces that shape them. The objective of the first part of this chapter is to demonstrate how this comes to be. While taking a general view, the research attempts to observe the built environment at a more local level to avoid generalisations, and gain a more practical approach to the study. In attempting to do so the second part of the chapter observes the local environment as an entity. This entity is defined as having a set of natural physical qualities defining its boundaries, a definitive and distinct process transforming its built environment and a local population that is more or less homogenous. The objective of defining the local environment system is to later assess the powers that control it.

1.2 Economic Force

1.2.1 Economy, Control and Built Form

Economics have been identified as major driving forces today that affect everything in our daily lives. The term economy itself can be ambiguous and may mean many different things. It is accepted as being fundamental that anything must make economic sense. The cost of building something, for example, must be weighed against the benefits of doing so. However, economics can affect our lives in different ways. Built environments rely on the existence of a local economy to employ its local inhabitants and are the vessel in which different activities are undertaken. Those who inhabit the built environment need it to support their activities, whether these activities are directed at earning a living or constitute other social functions.

Cities and urban centres grow through their ability to provide more people with the means to earn a living. Urban growth is clearly related to local economic growth. The influx of money and wealth attracts more people, therefore creating a growing need for housing and services that are provided for by the building industry. Similarly, a weakness in the local economy will cause a decrease in pay and employment and tend to

cause people to migrate. This is similar to how ancient civilisations gathered around sources of water, because their livelihood depended on it such as those of the Nile valley and the Tigris and Euphrates. Today people's livelihoods hugely depend on employment, where economic sufficiency is essential.

Economics control the formation, growth or decline of built environments, and therefore their very existence. They affect not only their growth or decline but also the built and urban forms themselves. In order to observe this, attention must be shifted from the term *economy* to the term *economic activity*, because it is economic activity such as shops, factories, and workshops, etc, that built form accommodates. The term economic activity can be seen at a more local level than the macro local economy. In this way a form of local economy (industry or tourism for example) has the ability to alter economic activity which in turn affects the built form that this economic activity occupies. Changes that take place in the type of local economic activities will correspond to changes in built and urban forms that accommodate them. For example such changes might include a shift from relying on industry oriented activities to those of tourism. The first requires large factories, the second hotels and shops. Significant changes from small business to large industry and mass production will necessarily mean a concentration of activities, and therefore a greater need for transport to and from work (Nabih, 1984 Ch:1). This in turn will tend to cause crowding in roads through the extensive use of the automobile.

Since this research is about control, it focuses on how changes in the identity of the parties[1] that control economic activity will affect the built form that this activity has to occupy. This can best be seen in observing the parties that own the activities and therefore its built form. Ownership is not the only controlling power here. The state also has strong powers of control through the application of economic policy as laid down by government. The identities of the parties that own large business and multinational corporations and those who own small businesses contrast greatly[2]. The former tends to be owned by stockholders and large agencies, the latter owned by individuals or small groups of people. The effect of economy on urban form has been commented on by

[1] Parties refer to an individual or group of people such as owners or users. The concept of parties and powers will be is introduced in Chapter 4.
[2] Control over economic activity is elaborated in Chapter 5.

many authors and will be presented during the remainder of this chapter. These effects are also discussed in Chapter 5 as an economic function of local control.

1.2.2 Schumacher and the Economic Dimension

A discussion of mass production is important because it is linked with employment of large numbers of labour within one area. This not only causes a growth in urban form where the industry is situated, but also the migration of people from one area to another in turn causes the decline of the urban areas from which the population is migrating. In the case of the developing world, this is a very apparent situation where urban centres are rapidly growing. Ghandi stated while commenting on large industry that what the poor of the world need is production by the masses and not mass production (Ghandi in Schumacher 1969: 171).

It is important to mention E.F.Schumacher when discussing the different effects of large and small-scale production alike. He has commented on many issues relating to economics and industry. Of these is the need by large-scale industries of a plentiful supply of cheap energy sources. In the context of industrial history, this need meant resorting to non-renewable energy resources these overwhelmingly being in the form of fossil fuels and nuclear generated energy. Both these energy sources directly harm our natural environment and are continuous threats to life on a global scale. These concerns are strongly held by many and among others in literature on sustainability.

Schumacher (1969: 120) also commented on the nature of employment in large industry, which tends to be uninspiring, repetitive, and monotonous. He accuses industry of demeaning people to the level of machines unable to connect to and feel the same amount of pride in work, as do craftsmen. Karl Marx commented that mass production produced useless people (Marx in Schumacher 1969: 28). Employment in mass industry is obviously less inspiring and mentally stimulating than that of craftwork such as carpentry and masonry.

Schumacher introduced the concept of intermediate technology (also termed appropriate technology). The objective behind it is to develop a kind of technology that would once more enable individuals and communities to satisfy their needs without resorting to the products of large industry. It concerns a methodology for self-help for communities.

Schumacher's approach in economic activity is oriented towards self-help and community based economies. This approach is also found in literature on sustainability. Whether a society is dependent on large-scale industrial manufacture or on small and intermediate-scale local manufacture has a significant affect on its built environment. This notion is elaborated and further investigated in this thesis in Chapter 5.

1.3 The Urban Environment

1.3.1 The City Megalopolis

The majority of built form today is found in large cities (Correa, C. 1989:17). These places are often associated with many social problems, such as providing suitable shelter and adequate living standards. Problems found in big urban centres show strong similarities whether in a developed country as is the case of New York or in cities of developing nations such as Bombay. These include escalating crime rates, housing insufficiency and inadequate utilities and services, and are common in many cases. High population densities are another common characteristic. These are caused by migration from rural to urban areas mostly in search of work, added to self-generating internal population increases (Correa, C. 1989: 119). Urban problems are not restricted to affluent cities. Los Angeles in the United States, although renowned for its high individual income levels and resources, is much criticised because of its high pollution. This is caused by segregation of land use because of a popular preference by residents to live on the city peripheries, adding further to already to high use of the automobile (Eduardo E. Lozano 1990: 131). Pollution, crime, deprivation, homelessness, crowding and other forms of environmental decline can all be found in large urban centres while varying in intensity. This is not to say that the city always provides a worse quality environment than rural areas, but that many of the symptoms of high urban densities seem to be similar.

1.3.2 Population Polarisation

Cities are the result of a concentration of people. This can be termed as population polarisation (concentration of population in some areas, dilution or decline in others), and is promoted by industrialisation, institutionalisation and perceived prosperity: in other words the existence of an aspect of civilisation. The formation of the built environment becomes a function of population migration.

The United States is an example of such a polarisation. It is divided into what may be described as three immense "megalopolis" areas. One extends from Boston to Washington, a continuous built up area containing sixty million people. Another around Chicago also has sixty million inhabitants. A third continuous built up area with sixty million people lies from San Francisco to San Diego. The rest of the country is left practically empty and sparsely populated with isolated provincial towns (Schumacher 1973: 51). Another example is that of Egypt where two thirds of the population live in the Nile delta area (Nabih 1982, Ch:1).

Many authors have commented on population migration and its effects in defining the urban environment. One of those is Mumford (1963), who studied the formation of large cities in which enormous numbers of people were needed to fuel the creation of wealth. He associates the creation of a large megalopolis with the *"the slavery of large numbers"* (Mumford 1963: 528). Ebenezer Howard also observed urban environments in terms of mobilisation of people. He observed the existence of three area magnets that attract people. They are the town, country, and town-country. He stresses the positive impacts of living in a suburban environment and observing the negative qualities of both town and country in a study encouraging *garden cities*.

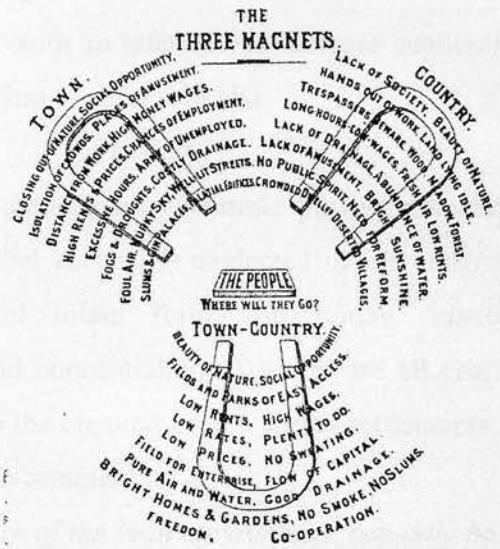

Fig: 1. 1 Ebenezer Howards' diagram on people's choice of location whether country or city (Correa, C. 1989: 24).

1.3.3 The City as a Centre and Function of Political and Economic Power

Mumford has most notably observed that the urban environment can be seen as a function of political and economic power. This observation applies to any urban environment, although more so to those which constitute a part of a large city. Although this research focuses on what it defines to be the local environment system, Mumford's observations can still be applied to varying extents on urban environments of a smaller scale whether they be part of a larger city or not. The local environment system[1], as will be later defined in this chapter, may include distinct urban settlements or areas parts of large cities.

Mumford defined the city as a process of *"accretions of power"* (Mumford 1963: 525). This is a view that held in this research. The formation of the built environment is subject to the power structure in which it exists. As such it is important to understand those powers that affect the urban environment in order to understand the form that results. Examples of built form influenced by power are many and varied. One example is the layout of Washington, which was planned to suit political purposes and to become symbolic of the Federation of the United States. Focal points of the city are all related to symbols of the government, and decisions relating to overall form are central state ones. Other examples might include the creation of satellite towns as a result of state decisions, possibly with an intention to increase economic growth by introducing new industrial bases within an urban context.

The interrelated political and economic powers associated with urban centres are a significant factor that cannot be neglected in the understanding of the transformation through history of urban form until today. Institutionalisation, centralisation, industrialisation and concentration of power are all characteristics of the megalopolis City, in addition to the creation of new urban settlements. All these are functions of the form of the built environment.

> *The structure of the built environment can only be understood within the economic system, the judicial system, and the political system.*
> (Lange 1988: 612)

Thus Lange mentions three functions of the structure of the built environment: economic system; judicial system; and political system. However the judicial system

and the political system can both be seen as part of the overall political system, because it is the political system that defines the judicial system and its laws.

Urban form is therefore a depiction of the balance of power. Mumford states that *"the organic, the qualitative, and the autonomous were reduced to a secondary position,"* (Mumford 1963: 531). It is significant that the terms organic, autonomous, and qualitative come together as synonyms of the same environment. Autonomous here must mean an environment system with decentralised control. Such an environment cannot be found with the existence of the dominant external political and economic forces that impair organic self-control and autonomy in the local environment.

Political control is a dominant feature of the large city. The city accommodates most governmental institutions, whether they are local or central. These contribute to a large part of the employment creating scores of officials, bureaucrats, clerks, and secretaries. As the home of the holders of power, the city is controlled in all its aspects. This makes natural growth processes of built form unacceptable, and are inevitably replaced with rules and regulations enforced through a well-structured judicial system.

At the same time political centralisation goes hand in hand with economic corporate monopoly. This centralisation facilitates large-scale economic enterprise and domination. Whereas the transformation of political power that was once spread over the length and breadth of a land and its population is now concentrated in the city centre, and this means that in order to obtain wealth one was compelled to go to the metropolis to exercise influence. An evident politico-economic monopolistic culture is the norm of the city social system (Mumford 1963). All this in turn attracts economic activity and employment and therefore population migration.

1.3.4 The Urban Machine and the Problem of Overwhelming Size

If one wishes to control a certain phenomenon, one attempts to alter it in order to fulfil ones own set of objectives. This may be called a process of mechanisation. The size and compactness of the city force decision-makers to attempt to organise the activities that take place in order to achieve a perceived quality in the environment. This organisation process is achieved through the determination of a set of rules that primarily define

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[1] The local environment system can be seen as having a distinct process that determines its formation.

peoples' rights in relation to each other. Rules are obviously needed to organise society and save the rights of its individuals, but at the same time they are a way of achieving specified objectives whether these are related to urban form or not. This process is an attempt to redefine and control a certain phenomenon in a particular way and towards certain objectives put down by those who wish to bring change. In the case of the built environment, it is an attempt to regulate or control its processes and to mechanise it towards a particular set of goals (e.g. improving accessibility).

If we hold the view that the built environment is a living organism, then these rules impede its natural growth and convert it to a machine created to meet predefined goals. The observation of human activities substantiates that the built environment is a living entity, because society or the community that occupies it grows and develops adaptations to changes in the environment similar to any other living being. A local environment comprises of both physical environments (natural and man made), and the society that lives in it. Each is part of one system and as the community grows so does its built form.

The planning profession is largely responsible for the mechanisation of the built environment. Technical requirements embodied in regulation, law and policy; are its tools of control. These act to standardise and reduce diversity in built form and create much of the monotony characteristic of many examples contemporary development; rather like the factory that standardises its output product as repetitive units, all of which are identical. Mumford (1966) compared the city to a mega-machine responsible for producing monotonous repetitive built forms that are never ending and do not fulfil human needs; a machine of control and power.

Lozano (1990: 73) views the built environment as a complex system. He observes natural processes of self-regulation and self-organisation in this system. These processes regulate transport, land prices, tax revenues, local employment and development. One example is how individuals choose to buy or sell their homes depending on employment opportunities. This is at the same time related to the amount of local development providing housing. Likewise fluctuating tax rates in addition to other economic criteria determine real estate prices. All these are also related and affected by the social and cultural characteristics of those who live in the urban environment. Few of these factors

are entirely natural organic processes but are predominantly determined by central policy. If these policies are not of a strong controlling nature and do not intervene with the self-regulation and organisation, the environment will be able to adapt and naturally progress towards improvement. Lozano states:

> *to control uncertainty and guide the system toward stability is the role of planning, but we may never achieve this.*
> (Eduardo E. Lozano 1990: 77).

This is to say that it may be better to allow natural growth of the built environment than continuously attempt to control it. This could result in a built environment that is qualitatively better adapted to the needs of those who live in it, than one where we define particular objectives to be achieved and in so doing forget its complex nature causing its deterioration in other areas. The perception of a need to organise our built environments emerges from an awareness of its size. This demands some central organisation and regulation, but such intervention should be minimal through broad flexible policies, not rigid fragmentary regulation.

1.3.5 Synthesis of Problems and Autonomy

As has been previously suggested a large part of problems in our societies can be linked to the city, not solely because most people live there. It is safe to claim that cities are the economic and political centres of a nation. It can also be suggested that central control is "part and parcel" of the city culture. Not only is there a lack of self-determination for the individual and collective community, this dominance exceeds the spatial boundaries of the city (through political and economic control and power) extending to suburban and rural areas. The economic decline of regions and rural areas can be traced back to this reason.

Much of the previous discussions is focussed on the city, because the latter is representative of urban form in general. Large urban environments seem to be subject to stronger central control and powers than those that are small or peripheral. The city in its entirety can be viewed as one entity or at the same time as comprising a number of sub entities or settlements that are distinct within the overall city structure (a hierarchy of urban environments). In many instances it is difficult to locate boundaries between these sub-settlements (due to their compact nature and interconnectedness). Distinctions can be made according to a number of factors that shall be determined while discussing the nature of the local environment.

Part of defining the boundary of the local environment is to define the level of local control and self-determination that can be found. The term *autonomy* can be applied to a local environment that has an internal system of control (this shall be elaborated further in Chapter 2 when analysing different environments as systems). Internal control, self-reliance and self-management are all qualities of this system. The concept of *self-reliance* is part of Local Agenda 21, the UN document on local sustainability.

The research defines control within the local environment to mean a number of things, among which is self-reliance in terms of resources. In terms of built form, this is shown through a local process of urban growth that is determined internally. This will be defined while reviewing the processes that transform the built environment and determine it at the end of this chapter.

1.3.6 Orientation of Control in Design and Architectural Theory

Up to now this chapter has only discussed the effects of political and economic forces the powers of control on the overall urban form. These powers also affect designers and architects. Lange states:

> *It is almost inevitable that the work of individual designers is directly in the service of those who hold power in society, either because they have the economic resources necessary to build, or the political power to muster up those resources.*
> (Lange, 1988: 618).

It is therefore true that architects are subject to the same forces that shape urban form, but in a different way and on a different scale. If the works of the great architects of the century are studied, it can be argued that the most important work was the largest in scale; probably because large projects are more identifiable and give an impression of grandiose. Such projects are expensive ones. In order for these projects to materialise, vast resources must be available. This is only possible when architects are commissioned by the state, wealthy businessmen, or large organisations. It is therefore necessary to translate the needs and inclinations of these clients into built form. This can be seen in the work of Le Corbusier with his large housing projects, in the work of Mies van der Rohe, particularly his skyscrapers, and in the work of Frank Lloyd Wright such as the Johnson Company buildings.

Shifts in architectural theory have also been seen to accommodate political and economic transformation of power in society: *"Shifts from one era of architectural design (Modernism-- Post Modernism) to another, inevitably paralleled by a shift in the power structure of society"* (Lange, 1988:627). This was made possible by the centralisation of architectural commissioning from the user to organisations and institutions. In particular, a link in theory to accommodate political change is seen when during the Second World War architects courted the political system of the Nazi power structure. *"When Nazis came to power Walter Gropius and other leading architects of the Bauhaus tried to justify modern architecture in nationalistic terms, `its Germanness`"* (Jencks 1971: 125). The formation of the built environment from its design to the overall layout of the urban environment has thus always accommodated larger powers, particularly political and economic ones.

1.3.7 Architectural Determinism

Environmental determinism is an important issue when discussing man environment relationships, and therefore when observing the human environment as one ecosystem. Determinism refers to the belief that changes in the physical environment will lead to a change in the social behaviour and aesthetic values of those who occupy it (Ke Chen 1992: 67). That the relationship between man and his environment is one sided extending from the physical environment to man cannot be true. Porteous (1977) indicates that this is a two-way / bilateral relationship. In other words that the physical environment will affect human behaviour, but at the same time human behaviour also has an effect on the environment.

Architectural determinism claims that changing peoples physical surroundings can bring about a positive change in their attitudes and perceptions, and therefore improve their environment according to a set of standards put forward by professionals. These standards are set by the decision-makers perception of quality, and reinforce the view that the designer and planner as professionals know best. This represents a move towards decision-making that is "top down" and non-inclusive of those who are to be affected by them.

With this in mind, architectural masters put forward their individualistic philosophies and ideas of how people should live, creating new personal paradigms of architectural

thinking. Unfortunately, time rendered many of these ideas faulty, where many masterpieces have become non-functional and sometimes allienating to those who use them. There are numerous examples of this such as Frank Lloyd Wright's Guggenheim Museum (which although a splendid statement in itself has been revealed to be a failure in its ability to display art). Le Corbusier's Villa Savoy, and the Unite De Habitation. Such examples endorse a return to endogenous organic form, which continue to be used on the needs of those who will use it. Similar examples can be found for many planning projects that have taken time to prove their failure. One of which is the plan of New Delhi, which has proved to defy efficient public transport despite extensive effort and research put into the master plan (Correa 1989: 66).

1.4 The Local Environment System

The following section will attempt to define the local environment system by defining its three components, which are: the man made environment as seen in the built environment; the natural environment; and those who inhabit it as seen in the local population or community. These three components define the boundaries of the local environment system and what makes it distinct from its surroundings.

1.4.1 Community

In defining what is meant by local environment in this research, it is necessary to define what it means by the term *community*. When studying urban environments the man made takes up a larger part of the physical environment than the natural. Community is the most important element of the local environment, and it is the target to attempt to improve on its quality of life (the embodiment of the collective individual) by accommodating individual needs into the built form.

The term community in architectural literature relates to a sort of lifestyle that seems to be no longer existent, while at the same time its revival is constantly being attempted. Much is being said about community design as a new paradigm to replace urban design (Lozano, Eduardo E., 1990). There seems to be a loss of the sense of community among those who inhabit the new urban landscape. Lozano remarks on the loss of community life; *"If community life and urbanity are missing from human experience, there is a serious flaw in society."* (Lozano, Eduardo E., 1990:1).

However this dissertation attempts to address what it means by community in the context of the local environment. In order to do so definitions of community must be put forward elaborating on how it is seen in the context of this research. Community can be seen as a segment of society and mankind defined in size and nature according to one's objectives. As such, addressing and targeting community, as a smaller segment of society, goes towards enhancing quality of life for mankind.

Unfortunately the term is currently freely used and stretched in meaning, necessitating definition particularly when used in research. Linguistic comprehension defines it as a group of people bound together by a *common* sharing of something. It is the broadness of that which can be shared that causes confusion. This is also evident in the interchangeable use of *society* and *community*. We may refer to the people of a nation, for example Egypt, as the Egyptian community or the Egyptian society. However, there is common acceptance that society refers to a larger population of people.

1.4.2 Understanding Community

A cross-disciplinary consensus on the definition of the term has not been established, and has therefore been used to mean different things from a state of emotion, a sociological sample, or a geographical location (Scherer 1972 in Richardson 1993: 24). This has resulted in an abuse of the term. This happens by association with a simpler lifestyle and a hunger for the ways and values of the past, making it appealing to many and therefore used as a method of seduction and rallying of popular opinion for something that may differ in reality.

Our understanding of community may incorporate a number of different qualities such as culture and cultural norms, subsistence activity and economy, religion, ethnic origin, location, method of governance etc. Accepting that the core concept is sharing, then we can assume that a population will be more representative of community status the larger number of qualities it has that are commonly shared.

Some common notions that contribute to our understanding are that of a place where everyone knows everyone else (Richardson G.M. 1993: 24), and where there is cohesion between individuals and of acting together towards common goals. Sharing plays a vital role in reinforcing these notions because it causes interaction between people, creating

the appropriate environment for communication. This is not the only core concept. Another that can be identified and which is crucial to this research, is that of community self-determination as will be identified during the remainder of the research.

1.5 Definitions of Community

As previously mentioned a cross-disciplinary definition has not been identified, but different definitions have been found according to the focus of each. The different interpretations of each in its area are important in developing a general overall understanding.

1.5.1 Talcott and Parsons

Talcott parsons focuses in his definition of community on the physical location and the activities undertaken by the existent population defining it as,

> *A collectivity of actors sharing in a common territorial area as the base for carrying out the greatest share of daily activities.*
> (Talcott & Parsons in Bell & Newby 1971)

The physical location referred to is particularly important to architects, planners and all those working in relation to the built environment. It also refers, very appropriately, to the sharing not only of the physical territory but also of day to day activities. The term *activities* include religious activity, subsistence or economic activity, or cultural activities and others depending on what is shared.

1.5.2 Scherer

Scherer focuses mainly on the social aspects of community. She defines community as the *shared association of other people* (Scherer 1972). Although shared association entails the sharing of something else whether it is something physical or an activity yet *shared association* can be sharing the same work location or occupation. In other words the amount or value of what is shared is not a defining factor, rendering the definition vague. Yet, she does claim that communities are vague. Scherer takes into account organizations and associations as well as ethnic and family groupings, rendering it a definition applicable to society, not necessarily community. This definition negates the association of community with geographic or physical location, reducing its value in studying the built environment. However, it does assist in understanding communication and interaction between individuals and therefore sheds some light on the operation of community organizations.

1.5.3 Ferdinand Tönnies

Tönnies, regarded as the founding father of community theory, clearly differentiated between society and community a distinction that Scherer failed to identify. To him the physical location was a fundamental part of defining community. Where the population is immobile, there existed a common culture and more importantly a moral responsibility over the environment. On the other hand impersonal ties typify society, with sharing of status but without sharing of anything physical. Activities may or may not be shared. This is in sharp contrast to members of a small town church congregation. Importantly also is the referral by Tönnies (1957) to community/society and to artificial/organic as extremes that are to be identified, and possibly used as a method of measuring the degree to which a population reaches community state.

1.5.4 Suttles

Suttles contributes to defining community by categorisation in terms of size and social contact offering us a hierarchy of community definitions. The first is smaller than a neighbourhood, and in it people identify each other by face to face and personal contact. Here people will share a bus stop or small local shops, and children share play areas. The second is the *defended neighbourhood*, where people share the local church or mosque and local stores, and members more or less know each other but not necessarily on a personal level. Both of the previous sizes have no governmental representation. This level may have some forms of community associations, like forums or neighbourhood watch programs. The third is the *community of limited liability*. This one has an official identity in local government, and more central services like departmental store or sports facilities. The fourth and final is the expanded community of limited liability, which has access to governmental administration and possible local government representation. This level will obviously have more central services, and may be a large part of a city (Suttles 1972). Suttles' understanding of community takes into account contemporary characteristics of our communities, putting aside classic notions that come to mind. Although this approach has the very important quality of being practical, we can argue that our modern society has lost the characteristics where by we can define community life in them.

1.5.5 The Chicago School

The Chicago School of Sociology is of particular significance in this research because of the ecological systems approach used by the school (Systems Approach will be examined in Chapter 2). Recognised as founder of the study of human ecology, Robert Park (1968) identifies community by means of the basic elements of systems. The ecological approach entails identification of components of the system and interaction between them and incorporates system concepts such as holism, structure, time, communication between members, and organisation (groups & sub groups). Here physical location is an integral part of the community system where interaction between members and physical environment is fundamental. Families, corporate and territorial units, age groups, sex, class, clubs, and neighbourhood associations, are all identifiable groups and components of the system.

What makes this approach of particular significance is its comparability to a living self-sufficient biological entity. This implies self-determination self-control and possibly autonomy of the system, the main theme of this research, by recognising the ability of a community to shape its environment

1.5.6 Community in Local Sustainability

The term community is identifiable in sustainability, particularly when it comes to its Local Agenda 21. It attempts to alter current methods to improving our environments from the common centralised top/down to decentralised bottom/up approaches. In doing so it aims to tap community potentials in affording appropriate decision making and execution of plans (Hague, C 1997). *Think global, act local* is one of the most common phrases quoted in sustainability, where local refers to community action.

Using methods that target communities in order to promote change is not the only reason. Another, maybe more important one, concerns strengthening localities to make them self-sufficient and self-reliant, therefore improving life in them and halting migration to the city. This must not lead us to think that communities are recognised only outside of the city, but also within urban areas.

A major part of sustainability efforts and initiatives are local and community based (Roseland M 1992). Community corporations can have many functions such as

economic development, management and maintenance of the built environment, or security. This is therefore a practical approach, not one dogged by classical notions of community, but nevertheless attempts to achieve classical values of co-operation and unity.

1.5.7 Concluding Defining Community

The variations in definition of community each contribute something to our understanding. While Talcott stresses both physical location and sharing of activities, Scherer only mentions social relations and interaction, neglecting any physical determinant. Suttles offers clarity in meaning by means of a hierarchy in size, enabling us to determine community qualities at each level. Tönnies clarifies the difference between community and society in a manner similar to that of Suttles.

Although each is crucial in giving the overall picture, it is the approach used by the Chicago School that is the one advocated and used in this study. It gives a systems understanding, rather than focus on any particular quality or qualities a community has. This, combined with the practicalities of sustainability is used for understanding and application in the case study.

Addressing community in this study is two-fold;

1- Defining the meaning and concept of community, the focus point of this study and as the unit of operation;
2- Comprehending possible potentials of community control towards improving the built environment;

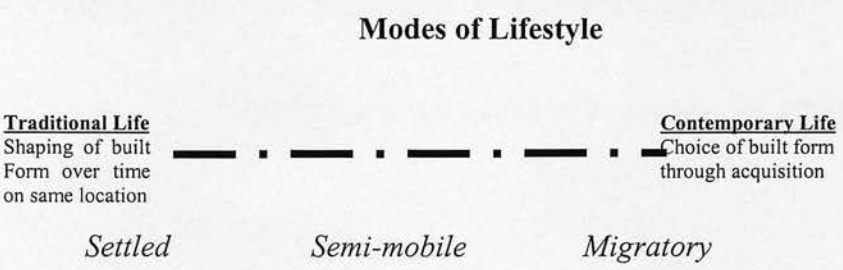

Fig: 1. 2 Modes of lifestyles

People should also relate to the dimension of time, which is an important contributing factor to local community status. This is because the longer a population of people live together in one place then there is an increase of shared values between them and the place they are living in. That is why community status seem to be more representatives

of traditional or indigenous areas where the population has existed for a long time. This corresponds with the term *immobile* used by Tönnies. This is in contrast to contemporary environments where people tend to come and go according to employment opportunity. Consequently there is no longer a sharing of values and bonding with place and people (Fig: 1.2). One group of people is more mobile and migratory and the second more settled and place oriented. This is an important determinant of the local population and the extent to which it may represent a community.

1.6 The Physical Environment

The physical environment is made up of the natural and the man-made or urban environment. Both the community and the physical environment make up the local environment system. They interact with each other as shall be demonstrated when analysing them in Chapter 3. Since the research focuses on built form, the man made component of the local environment is particularly significant.

1.6.1 The Man Made Physical Environment / Built Environment

The man made physical environment is the focus of this study. It can work to define what is meant by local environment. The local environment must have qualities that make it distinct from its surroundings. This applies to all its components. In the case of the built environment what will make it distinct is the process of its formation, not only its physical form. The research concentrates on the process of formation because through it the parties that have control can be defined. The research introduces four major processes or mechanisms by which the built environment can be formed. These are:

- State Planning and construction of a settlement or prospective urban environment;
- Private development;
- Land Allotment;
- Vernacular Organic Growth.

Each of these processes identifies roles to a number of parties that share responsibility in their formation. These parties are represented in the following:

- The Politician;
- The Planner and Local Authority;
- The Designer / Architect;
- Community.

Each of the parties will have varying roles in terms of strengths according to the process of formation of the built environment (**Table 1.1**).

1.6.1.A State Planning and Execution of Urban Environment

This process is one that is controlled 'top-down' completely by the state. Although extreme, it is not always the case. It is characteristic of national housing programmes. Pertaining to states whose governments are centralised and authoritarian. In such cases the state is responsible for everything. Even the building process may be executed by state-owned contracting companies (e.g. Egypt). It can also be a quality of areas where there is a shortage of housing, and the state intervenes to provide affordable housing where this need would not normally be met by the private sector. There is a very strong role for the politician in such cases. He or she is often motivated to solve problems of housing shortages by creating large state-owned housing projects in order to satisfy the electorate that brought him or her to power. Such projects are geared towards objectives such as economic cost, healthy living standards or sustainability as viewed by the politician. In such cases the design promotes objectives that are not influenced by local environmental circumstances, and may be unsuited to the local environment. The planner and local authority will have similar roles to play within this process as the politician, but varying according to the individual or party that suggests and initiates the project. It is probable that the politician and local authority will share responsibility for implementing such initiatives.

The role for the designer whether urban designer or architect depends on the room left for them by the planner and whether or not many rules and regulatory procedures restrict them. The largest restriction of all is that of keeping cost down, particularly when housing the needy and where there are state subsidies that need to be kept to a minimum. It is possible that there would be a larger role for the architect than the urban designer, in order to keep design costs down, often resulting in repetitive design.

The third party and most important one in relation to the local environment is that of the community or local population. It is difficult to call those people who are to live in such a project a community because they have only come together as a result of circumstance and not choice. They are diverse in terms of their background and will not share much except maybe after a period of time significant enough to establish bonding between

them. They often have no role to play in the formation process of the built environment whatsoever.

1.6.1.B Private Sector Development

This type of development can be large scale although not to the extent of large housing projects and master planning put forward by the state. It is often a provision of housing coupled with commercial development. The role of the politician in this case is whether or not to promote private development and allow it to operate freely or to regulate it. This all depends on the political ideology of those in power. Nevertheless the state cannot play a strong role but many of the decisions pertaining to form are in the hands of the developer him/ her-self. The local authority can play a similar role to that of the politician towards this type of development, but being closer to the developer than the state is able to exert influence to a larger extent.

The planner is in a different situation when the developer employs him. In this case the planner works to translate the goal of the developer into the built form and master plan. In such a case he has a strong role to play in defining the form of the built environment through general guides and policy. The designer is also employed, and likewise must translate the objectives of the developer. While the designer has the ability to portray his or her views he is restricted to an extent by the developers values and planners outline.

In this case the role of the individual and community in defining built form is very small. This is because the only influence the individual and populace who choose to live in the project have, is the power to choose between different built forms that are on offer in the market. As with the state planning and execution of built environments in housing projects, commentators cannot recognise the existence of a role for the community in formation except after the passing of a length of time when adaptations may take place.

1.6.1.C Land Allotment

Land allotment is the third process by which the formation of the built environment can exist. Allotments can exist as a result or state of private sector development. In Egypt, land allotment is found more in the case of state development. There are also many co-operatives that develop land for their members. In some cases private sector development schemes will include allotment.

The politician has the power to encourage such schemes or to discourage them. But the state will play only the role of providing the master plan and will not take part in the design or building of individual units. Depending on the amount of regulation that the state decides should be applied, and through building codes, the strength of the role of the state in determining the built form will transform itself. The role varies then, but it is not a dominant one. The planner and local authority have a larger role to play in land allotment schemes. The local authority will have a larger role than the state because it is closer. The planner will translate the objectives of the state modified by his personal expertise. His role, on average regulates built form more than that of the politician.

The designer in this case is only an architect, because there is no overall urban design. His role is to work with the individual client and translate his needs together with the architect's personal experience and expertise into the built form. In such a case there is considerable scope for architect's personal creativity, but within the restrictions of the client's needs and planner's regulations.

The community or the local population has a very weak role if any in defining the overall urban form. They may have the ability to alter some elements of the urban landscape, though this is only possible after a period of time and often planning permission is required. However power of the community appears in their combined ability to shape their own individual units. In this case the architecture of the settlement is a result of their preferences and needs. In this way their role may be seen to be a strong one.

1.6.1.D Vernacular / Organic Growth

This process of formation of the urban environment is one that has existed for centuries. It has no fixed restrictions or building regulations. Rather it is a tacit system that relies on a local system of unwritten norms that develop with time. Such urban settlements can be found in the old town quarters of many large cities today and some old villages. Often streets and walkways are not straight, but bend to adapt to the landscape among other factors. Although this process is a quality of very old urban forms that existed when there was no or little regulation of the built environment, the process can exist today in many informal settlements particularly in undeveloped countries.

	State Planning & Execution Built Environment	Private Sector Development	Land Allotment	Vernacular/Organic Growth
Examples:	Master planning and housing schemes	Housing and commercial development (private sector)	Land allotment schemes whether private sector development or state development (the norm)	Older existing urban environments, and informal settlements
Politician	Can lay down strategies & law in attempt to achieve healthy lifestyle, economic goals, sustainability. Sometimes action is too definitive, may work in one location and not the other. ***Strong Role***	Has the role of promoting private development or not, according to political ideology and climate. Also regulates & introduces guidelines. ***Average Role***	The role of the politician depends on his conviction to the idea, and determines the level or regulation there is to organise it. ***Varying Role***	The politician has no role or control but sometimes regulates them to a small extent. ***No Role***
Planner / Local Authority	Production of definitive plan, sometimes too well defined to allow freedom for the designer. ***Strong Role***	Has a similar role to that of the politician. Planner or consultant has the role of translating goal of developer. Both planner and developer have a ***Strong Role***	Puts forward the master plan and some building regulation, ***Average Role***	The planner has no role while local authorities may have a small regulatory role. ***Weak Role***
Designer / Architect	Works within the boundaries laid down by the planner. Often there is a weak role for the urban designer but a slightly larger one for the architect. ***Average Role***	Translating developers objectives and goals into built form ***Average Role***	Will work with individuals to translate their needs into the form. ***Translating Needs, & Personal Opinion***	Occasionally a designer is contracted, however mostly the design is made by the builder and owner working together. *Builder = Designer* ***Weak Role---- Average Role***
Community / Local Population	Has a weak role, sometimes little choice whereby a dwelling unit may be allocated. ***Very Weak ------ No Role***	Future community and individuals only have the power of choice to acquire, and not to directly shape. ***Power of Choice***	Role of the individual is high towards the form ***Strong Role*** Towards the overall urban form. is weak ***Weak Role***	Local community is the real definer of the overall urban environment, through a gradual organic process of formation. ***Strong Role***

Table 1. 1 The role of different parties in the different processes that form the built environment.

Examples of this are found in Cairo, where and when there is an inability to provide housing, the state allows this process to exist because it is an example of people providing for themselves (Nabih, 1999).

The politician does not have any role in the process, because it is totally initiated by the community through the efforts of individuals. The politician may try to discourage this process for many reason among which is an association with an unhealthy living environment. Planning gained prominence when, at the start of the century, planners set out to provide a built environment that would provide a basic infrastructure and prevent the spread of disease. In this way the perception of the living standards within such organic urban forms is often negative. This need not necessarily be true when adequate infrastructure is provided in these areas, something that can prove difficult when the building density is extremely high. The planner and local authority may attempt to impose some regulation on such settlements. This happens sometimes in Egypt although it is not a common experience. The role of the planner and local authority is usually weak in this case.

The designer's role is weak within the organic process. Mostly design will be defined co-operatively between the builder and the owner of the property, often to reduce costs. But in some cases a designer may be acquired. Urban design has no part in the formation of this sort of settlement. Often the builder is the one who transforms his experience and knowledge into construction and is able to determine structural design and safety.

The strong role of the community within this process of defining built form as a whole, is a very interesting one. The form is defined spontaneously and depending on availability of land, it is defined very flexibly with only one universal rule, which is not to cause harm to surrounding property or people. A strength in community ties and co-operation is essential for this process to exist. These community relations enable a local system of norms to exist and transform itself into the built form[1]. In this way the local community population has the ability to shape not only individual units, but cumulatively to determine the design style of the settlement. The community also determines the urban pattern gradually evolving in an organic form.

1.6.2 The Natural Physical Environment

The natural physical environment is an integral part of the local environment system. In native indigenous cultures, it was this 'untamed' physical environment that sheltered and fed the human beings that lived in it. However the physical natural environment shows its true significance today in providing the needed resources for man to exist. These resources can vary from food for nourishment, to timber for construction or firewood. Today these resources can provide a subsistence activity for a local population, such as in the case of coal mining or when farming cotton necessary for the textile industry. The qualities of the local natural environment can be used to determine some of the boundaries of the local environment system. This may be done by observing the natural landscape in terms of forests harvested for timber or rivers and lakes that can be used for fishing. Each local environment system is part of a larger natural environment system, and at the same time there are relationships between each environment system and those adjacent. This makes it difficult to define the natural boundaries. However, observing human activities and the use that is made of local resources by the local community can help to determine natural boundaries. In this way the natural physical environment can provide not only physical boundaries through the landscape, but can also identify boundaries of human activity determined by the existence of local resources.

1.7 Concluding Defining Local Environment

The local environment as discussed has three components. Local inhabitants or community, natural physical environment, and the man-made physical built environment. In identifying the local environment each component must contribute. Local inhabitants reflect an extent of homogenity and share many qualities between them, whether these are values or physical elements of the environment. Location in terms of the natural environment should have relatively defined natural boundaries such as lakes, rivers or mountains. Urban form contributes by defining the process of its formation and the boundaries of the process. It may do so both in terms of the homogeneity of its physical characteristics or the process of its formation. All these combine together to define local environment in the research process and in the case study.

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[1] This system of norms is observed in the case study and survey.

CHAPTER TWO
Sustainability

Sustainability

2.1 Foreword

Sustainability is increasingly emerging as one of the major contentious issues of national and international policies. It is discussed both in 'developed' and 'undeveloped' countries, in governmental and non-governmental (NGO) levels. Its relevance is being recognised across many disciplines:- economics, the social sciences, ecology, politics, agriculture, tourism; to name but a few. Each discipline has its own outlook, not only of the problem of non-sustainability but its remedies.

It is also important to note that sustainability does embrace the notion of the environment as a holistic system and not a two dimensioned entity, hence it is consistent with the approach taken in this research. It is also widely accepted today, and has become cross-disciplinary. In the global political arena, one of the most urgent areas of interest is how to best tackle the problem of climate change, a core problem that demands an international approach. The realisation that the survival of the human race is likely to be severely affected by climatic disruption gives the issue unprecedented importance and has propelled awareness of the significance of sustainability far beyond the world of the politician and into the public domain. It is however critical to realise that its implications go far beyond the single climatic issue, to involve all disciplines in order to achieve the common goals of sustaining the environment of the earth.

In this study sustainability is used as a measuring tool to assess the built environment. The reason for this is its ability to combine a wide array of indicators that are both global and local in a holistic way. These indicators address many persistent problems that are more relevant to how we live today.

2.1.1 Environmental Origins

Sustainability is strongly associated with and has its origins in environmental protection, particularly protection of our atmosphere from global warming. It is global warming that consumes the major part of any discussion on sustainability at governmental level. And it is this that prompted action by the then prime minister of the UK, Margaret Thatcher in the run up to the Earth Summit in Rio De Janeiro in 1992, to bring attention

to the importance of taking our natural environment seriously. This brought together, for the first time, world leaders to discuss the issue.

Sustainability originates further back, to environmental movements that first brought attention to the problem of climate change then understood to constitute Global warming. It must be acknowledged that environmentalism was the first to bring light to many ideas that have since become incorporated in mainstream discussion.

Accepting environmentalism as an origin of sustainability, we should relate to what maybe environmental "mile stones". Such may be the anti-war protests in USA against the Vietnam and Korea wars that coincided with the hippy movement of that era (the 1960s). These were not confined to the US only but also to Europe where similar protests and sentiments where echoed, although of less intensity. Those sentiments are not foreign to environmental ones, for not only do wars have a major effect on our environments but anti war activists also preached co-existence at one with nature. It is mostly these sentiments that the eco-protesters of today have built upon. Watching road protestors, who perhaps constitute the most significant aspect of the environmental movement, take many cues from the sixties movement where similarities with hippies are not unfounded, not only in methods but also in outward appearance.

The world should never forget Greenpeace which has become perhaps the major international environmental watchdog. It demonstrates an extremely radical stance when opposing governmental positions. Popular support for the organisation world-wide reflects an international recognition, not limited to the US and Europe, which calls for a need for environmental protection and awareness of large-scale issues.

Such sentiments are matched and recorded in the literature of some of the great thinkers of this century. Schumacher, an economist, put particular emphasis on the negative effects of different forms of energy production on our environments. Of these he focused on the extreme dangers of the use of nuclear energy and the difficulties disposing nuclear waste. He also advocated against over reliance on fossil fuels due to their depletion and to the pollution caused as a result of mass production economic activity and extensive use of the automobile particularly in the US. He also noted the social effects of mass production on communities by advocating economic activities that are labour intensive and that can be regulated from within the communities themselves.

Both negative affects of the use of inappropriate forms of energy and community empowerment are themes of united nations policies today, although the latter is recognised as the more urgent (Schumacher 1969). Patrick Geddes (1949) is also considered to be one of the instigators of environmental thinking, for his ability to clarify the interrelationships between natural systems and human activities. He visualised human activity as an integral dimension of the natural ecosystem. Also to this list we can add the works of Thomas Berry (1988) and Sale Kirkpatrick (1991) who following in the footsteps of the writings of previous authors are proponents of *Bio-regionalism*, a comprehensive environmental approach that envisages human ecology as part of the natural environment. This approach will resemble sustainability if we combine all its concepts and principles and put them into one approach that recognises inter-relationship between different components of the environment.

2.1.2 Definitions

In order to clarify some of the vagueness that surrounds sustainability it shall be approached to begin with from a literary dictionary definition. The Oxford Dictionary states that to sustain something is to *"to enable to last out, or to keep going continuously"* (Oxford Dictionary 1958). Therefore sustainability is the ability to sustain.

However, the definitions of sustainability cited by international organisations working with the concept differ from the dictionary definition. There are a number of cited definitions for sustainable development by those organisations. Accordingly sustainability is the ability of achieving sustainable development; and while there is no one commonly accepted definition (Haughton, G 1994: 16), the most commonly accepted and cited is that of the Brundtland Commission of the WCED[1]:

> *Sustainable Development is development, which meets the needs of the present without compromising the ability of future generations to meet their own needs.*
> (WCED 1987:43)

'Sustainable development' is not the only term to be used to address sustainability, but also 'sustainable growth' and 'sustainable use', all of which are used interchangeably; resulting in confusion. The IUCN[2] refuse the term 'sustainable growth', citing that

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[1] World Commission on Environment & Development
[2] The World Conservation Union.

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nothing can grow forever a fact that some economists seem not to understand. It also states that the term *sustainable use* must only be used to refer to renewable energy resources (IUCN 1991). 'Sustainable use', however earns the right to stand as a concept on it's own relating to a common culture or moral ethic to be adopted by communities and society. This is of significance because sustainable use is a concept that can readily be adopted. Alternatively, 'sustainable development' is planned and encompasses a large degree of central decision making even if it advocates de-centralised and co-operative approaches.

Similar to sustainable growth it can be argued that sustainable development is a contradictory term, for to sustain something is to maintain it in its current condition while development necessarily means change. Counter to this argument, sustainable development must be the type of change that can be brought about so as to reach an optimum environmental state that has the capability of being sustained into the future. This state is not only expected to achieve the physical objectives of the sustainable use of resources and sustenance of healthy climatic conditions, but also of a quality of living.

2.1.3 International Action towards Sustainability

Sustainability and environmentalism are closely related. While the latter is the outcome of relatively more radical and unofficially recognised groups; sustainability has been addressed mainly by governmental and other official bodies.

The reality of increased levels of international pollution led to the first international conference that recognised the interconnectedness of the world environment and the problems facing it. In 1972 the United Nations held the first International Conference on the Human Environment in Stockholm. Differences between the developed and developing world occurred, where the former wanted to discuss pollution and the latter wanted to discuss their more immediate concerns of the *eradication of poverty*. The major pollution concerns in the 1980s was radiation which was a particularly political issue because of the almost universal opposition and fear of nuclear energy, especially after the Chernobil incident in the USSR. This along with increasing pollution in rivers, acid rain, ozone layer depletion, and global warming, all compelled politicians to act even if that action has been inadequate.

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In Vienna 1985 and Montreal 1987 meetings were held to discuss the important issue of reducing ozone-depleting substances. By then evidence of ozone depletion was too strong to be disregarded finally forcing politicians to take some action. In 1987 the WCED issued *Our Common Future* also known as the Brundtland commission report which provided the most widely accepted definition for sustainable development.

However, it was evident that action only by the world leaders would be required to bring about the scale of change needed in order to save the planet from irreversible damage to its environment. This led world leaders to meet in the Earth Summit in Rio de Janeiro in 1992. Although the summit has been criticised for failing to come up with policies radical enough to solve problems, it did produce Agenda 21 that is a wide-ranging programme, a centrepiece for international co-operation that represents a local and national portfolio for action (Quarrie 1992). Follow-up meetings in Rio de Janeiro, held in Manchester in 1993 & 94 made sustainable cities the focal concern, putting pressure on those working with the built environment to produce solutions.

Since then the 1997 Tokyo Summit has taken place where debate was primarily about the shares of different countries contributing to pollution, and the allowance of some to buy the shares of others. Similar to Rio, there was a split between the developing and developed world. To make matters more complex and consensus more of a remote possibility, the US government was subjected to intensive pressure to agree to nothing by its business lobby, and received strong criticism in turn from other nations.

Parallel to international efforts, the concept of sustainability in its many interpretations was and still is taking form in research institutes, some NGO's[1], and workings of environmental authors. Sustainability can be seen as a theme to which each discipline can contribute. Those researching it and the built environment, have a major burden of intellectual effort to carry.

2.1.4 Criticism

The sustainability movement is often accused of being "more talk than action". This is true for a number of reasons. One might be because of its being in a stage of relative infancy where it is still being defined. Another is that in its association with environmentalism *"there is a strong temptation to use it superficially as a badge of*

environmental respectability." (LGMB Design Guideline 1995:8). This leads to misinterpretation of the true concept, which goes far beyond issues of environmental protection. This can be seen in common mistaken use of *sustainable development* to mean *environmental protection* or *sustained economic growth* to pay for environmental protection[2] (Roseland, M. 1992: 8).

It has also become a fashionable "buzzword" with which professionals feel out of touch if they are not seen to relate to it. It is common for some, even the most acclaimed, to try and contribute without any real understanding, thereby producing non genuine and meaningless ideas. There are, nonetheless, a growing number of professionals who make it their speciality, and are contributing needed genuine applications based on a true understanding. Environmental and sustainable research units in many universities encourage a growth in number of such professionals.

Sustainability applied to a single social system, be it architecture or agriculture, would be essentially futile if other systems continued to deplete finite energy resources. It demands pan-disciplinary operation, obliging all to redefine themselves and subscribe to an international holistic paradigm.

2.2 Sustainability Structure

The next section of this chapter defines goals, objectives, and methods of sustainability. These are based on the commonly accepted ideas of the concept, particularly those discussed by the UN and other international bodies. The objective is to provide a basis for forming a checklist of sustainable indicators, to assess conformity to principles, and to help identify domains of high potential.

2.2.1 Principles

Although, a need for sustainability is widely accepted, what it entails is not. This is because it is a political objective similar to democracy (Roseland, M. 1992). There are however a number of commonly accepted principles that are identified in literature which guide its approaches and actions. Of those are three commonly accepted which are recorded, by G. Haughton (1994: 17):

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[1] Non-governmental organisations
[2] Financing the development and application of technologies reducing pollution.

1- Principle of inter-generational equity (also referred to as the ***principle of futurity***): This maintains that human activity should not compromise future generations to meet their needs. It relates to the overexploitation of finite energy resources, namely fossil fuels, thus inhibiting future generations from its use. It can be applied similarly to factors causing irreversible damage to our natural environment, threatening the survival of future generations and a healthy existence. In essence, it means that human capital resources are not the monopoly of those who live today, but also the right of future generations;

2- Principle of social justice (also referred to as the principle of ***intra-generational equity***): This is concerned with the inequity in the consumption of the world's resources between different populations inhabiting the earth at any one time. Wider participation of communities is seen as a tool for achieving this. Such a principle cannot be directly linked to the definition of *`sustainability`*. People can understand the relationship if they take into account that *sustainability* also means sustaining the even distribution of a minimal amount of resources while ensuring a quality of life locally. This principle shows that the concerns of sustainability transcended mere concerns for maintaining the natural environment to those of achieving equity and quality. It also means that sustenance applies is not only across the time dimension but over geographical location. This may not be what first comes to mind but it is how this principle is explained in relation to the definition of sustainability;

3- Principle of transfrontier responsibility (also referred to as polluter pays principle), This principle aims mainly to allocate responsibility for pollution and over-exploitation across national boundaries. Clear cases of this are the effects of acid rain as felt in Scandinavia, and over-fishing by some EU countries affecting fish stocks in the territorial others. Frontiers are not necessarily national, but can be urban / rural frontiers. These are significant to the built environment because the principles requires that rural areas should not be subsidising urban pollutive practices and resource over consumption, and hence urban growth.

To these three principles can be added two introduced by Carew-Reid (1994: 15) as part of a list for practical guidelines for local sustainability:

4-***Principle of public trust***, which suggests that the state holds environmental resources in trust for the benefit of the public by not exploiting these resources. This guideline or

principle designates responsibility in the state towards the benefit of the public and future generations;

5-***The subsidiarity principle***, which suggests that decisions should be made by the communities affected, or on their behalf by authorities closest to them. This principle is pivotal to this study because it relates to decision making and therefore control. In general, sustainability prescribes participation of communities rather than *control.* Nonetheless this is recognition of the need of a higher level of *local control* and responsibility.

2.2.2 The Underlying Concept

Sustainability, particularly as defined by the UN associated organisations, and international bodies; attempts to cover all possible goals that can be covered (particularly social). This in turn disregards recognition of environmentalism as the source and core of sustainability, another factor fuelling criticism. To reconcile this situation, sustainability must either redefine itself or adjust and accommodate different goals in a way that maintains the original understanding of the concept. These goals can be classified into three main categories *social, economic,* and *environmental.* They must share one common defining concept in order for it to have a definitive, clearly demarcated agenda that restricts the insertion of inappropriate or recycled ideas.

There can be two approaches here, either to take the sustenance of our natural environment as an underlying concept, or to improve overall quality of life. If it is accepted that sustaining the natural environment and world resources is the underlying concept, then social and economic goals must be seen in light of the environmental objectives. To base criteria on social goals would be to argue for promotion of lifestyles and social habits that do not destroy our environment. This could include recycling and use of recycled materials, diverting the use of the private car for transport to cycling, walking and use of public transport. It may include providing information to people that will enable them to follow environmentally friendly lifestyles. Economic goals seen in the light of environmental objectives would include finding economic activities that are less pollutive; the production of recyclable products; and diverting the benefits of economic growth to pay for the expense of providing environmental protection[1].

However, if the underlying concept of sustainability is to sustain people's quality of life, then social and economic goals are more easily identifiable. Social goals will include achieving equity[2] and maintaining cultural diversity, enhancing the role of the family, enhancing a sense of community and citizenship, achieving equality and improving quality of life in addition to those social goals mentioned as part achieving environmental sustainability. Similarly, are those changes to economic activity so as to improve quality of life, one of which is the creation of wealth. These will include creating a sustainable local economy that improves people's lives, and improving working conditions. Similarly environmental goals need to be identified in their capacity to improve people's lives. Reduction of pollution promoting a healthy living, and maintaining the natural environment for all to enjoy, significantly improves the quality of our lives. This means that the environmental objective has a large role to play even if environmental protection is not the underlying concept (sustaining the natural environment) (**Fig: 2.1**).

A view of environmental sustainability is partly legitimate in that it is based on the origins of the movement. It is however incomplete unless it incorporates improvements to peoples lives and satisfies social goals. This should lead people to make a transition from environmental ecology to human ecology that accounts for human activities as well as the natural eco-system. The reason for the trend from purely environmental goals and objectives to qualitative social goals; can be attributed to the strong influence by the UN and the politicisation of the concept. It is because of the resources of the UN; whether it be money, or availability of media coverage; that gives it its current form. Environmental objectives occupy the most of effort and literature documented by the UN organisation, reflecting urgency of some environmental issues.

The wide scope of goals, some of which may be unrelated to each other, should not lead us to disregard the concept. Although this can be seen as a fault, it provides a unique opportunity to produce a much needed and more holistic approach to solving global problems within one framework. This is reciprocated in the UNCHS[3] Habitat Agenda definition of sustainable development: *"a process of change which improves peoples quality of life while protecting the natural and human resources on which future*

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[1] By developing and applying technologies that reduce pollution.
[2] Equity in provision of services and distribution of wealth is a social objective of the UN.
[3] UNHCS; United Nations Centre for Human Settlements.

generations rely" (UNCHS 1996). The Habitat provides a twin approach of defining quality while achieving environmental protection and resource management during the process. Perhaps it is reasonable to view environmental protection and resource management in their capacity of improving quality of life. We can then define sustainable development as the *change brought about to achieve a sustainable quality of life for man*, therefore linking the wide scope of ideas put forward under one concept. In achieving a quality of life quality, environmental goals realise their true significance in their strong capability to undermine not only quality of life, but also well-being and existence of mankind (over pollution and loss of ozone). It is this approach which is suggested in this study.

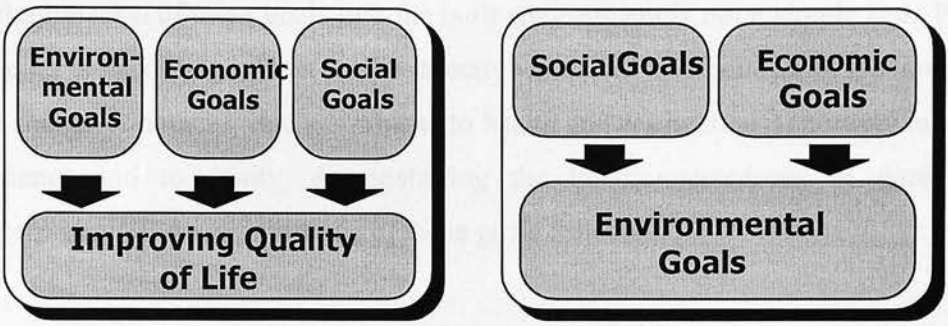

Fig: 2. 1 Possible concepts underlying sustainable development (author).

2.3 Social, Economic and Environmental Goals

It was suggested in the last section that goals could be classified into *social*, *economic* and *environmental* dimensions; and that these can be unified under one principle. The forth coming section will record major goals each in their relative category as found in literature. The objective is not to list all goals, which is impossible because they are constantly being changed and added to. The objective is therefore to provide clarity to a wide-ranging theory and help in producing an overall understanding. We must also take into account that the three dimensions of goals contribute to each other. For example economic goals will provide money thereby helping to execute other goals and pay for the development of environmentally friendly technologies.

2.3.1 Social Goals

Social goals are the most widely defined of the three dimensions. Attributed to them in literature in sustainability is the direct improvement of quality of life and therefore the contribution of built form to it. The social dimension is where many old concepts from different disciplines can be added without much alteration because of association with

quality. Most UN and Habitat[1] goals are defined in this dimension (**Fig: 2.2**). Some are probably only associated with sustainability by the international organisation many of which have very little to do with the built environment. Of significance are the following;

1- Equality for disabled & women.	7- Provision of shelter.
2- Equity between peoples.	8- Promoting the role of the family.
3- Education & environmental awareness.	9- Promoting the role of the community.
4- Human rights.	10- Political / civic rights, Participation.
5- Eradication of poverty.	11- Promoting social and cultural values.
6- Health.	12- Improving the quality of living.

Fig: 2. 2 Macro Social Goals of Sustainability

Interpretation of these goals into the built environment is not a simple task. Provision of shelter is the only goal that can be directly visualised into built form. However provision of shelter or housing also contributes to health and eradication of poverty in a less direct manner and to equity, demonstrating the interconnectedness of goals and their interpretation. An examination of these goals follows.

Equity and equality are less identifiable in the built environment. Both can relate to the provision of built forms that increase or decrease the disadvantage of a particular group according to race, sex, age, or class. For example, the women's movement has brought many debates concerns concerning women's needs and points of view, and claims that women are disadvantaged. These disadvantages build on the differing nature of the lives of men and women and a relative lack of employment of women in contrast to men, particularly married women. The perceived reason for this (as seen with reference to the built environment) is a divide between private and public, and urban and suburban realms. This results in the zoning of districts causing reduction in employment opportunities close to residential areas where women have to spend most of their time because of child rearing and household activities. Poor transport and accessibility in residential suburban locations are assumed to disadvantage employment of women with a diminishment in the availability of services (Parham, S 1993). Disadvantages are also identified in a lack of services within the suburbs, in contrast to the urban (male dominated) business centres, where there is an abundance of upmarket services (Huxley 1991). Other inequalities identified are lack of visibility in underused suburban walkways, thereby increasing possibility of physical attack of women, and the proximity of some residential areas to noise pollution from daytime traffic routes (Haughton,

[1] The Habitat Agenda of the UNHCS.

G.1994: 100). Indifference in urban form to the particular needs of women are thought to be because environments are *"developed largely by men and for men"* (Haughton, G. 1994:101) and the lack of participation in decision-making by women. However, while the strong influence of the male in the design of built form should be acknowledged, partly because of the higher percentage of male professionals, many of these deficiencies can be linked to other reasons. Land zoning patterns, for example, are the result of design concepts, and not necessarily of a stronger influence of the male. Accessibility, transport, and land use zoning are areas where deficiencies should be re-addressed.

Issues that apply to women can be equally applied to the poor and to perceived minorities. Differences can be identified between the living areas of the poor or minorities (in shantytowns) and middle class affluent suburban settlements. Availability and quality of services are in strong contrast; public transport is of poorer quality and a lesser availability. The poor will often inhabit inner run down city areas that are characterised by dereliction and decay, inferior quality infrastructure and services. It has been reported, even in the case of urban regeneration of such areas, and the pedestrianisation of inner city areas, that this will damage accessibility, thus further harming the disenfranchised, unless provision for parking is made (Haugthon, G. 1994). Many issues concerning the poor and urban minorities are generally brushed aside and ignored by decision-makers, rather than addressed because an inability to recognise their needs. The *Seattle Approach* is notable in the sustainable development of inner city areas. It is sparked by an increase in urban decay in many urban areas and its severity (Gary L 1996).

Another very important group that must be mentioned, and whose needs are not always recognised, are the disabled. While in the UK, the disabled is accommodated to a greater extent, this is not the case in most urban areas of the world. Their specific and diverse needs must be taken into account when discussing equality, as a minority group. The social goals of education and environmental awareness, and human rights cannot directly be linked to built form. Attempts made to link Human Rights and Democracy to sustainable urban development, particularly in relation to human needs have failed (to say to improve human rights is to increase sustainability), where China is often cited (D.W. Drakakis-Smith1995). These might be seen as an attempt to counter accusations that the developed world is to blame for the major part of environmental decline. The

Population Crises Committee (1992) indicates that in their experience of Pacific Asia proves the opposite of this. Environmental awareness and education (as quoted by the UN) are not easily translated into built form. The goal is to change social attitudes towards the environment. In so doing a number of objectives can be achieved. The public can influence politicians and decision-makers to take the environment into consideration. It will also realise a more valuable goal of influencing people to pay better attention to their environments and how they live in them. This will sway people in the choices is such things as the products they buy. Some consumers will opt to buy recycled products even when it is more costly. Similarly architecture can be influenced in a number of ways, including use of environmentally friendly building concepts and accommodating recycled materials in homes, apartment blocks and the urban fabric. The significance of environment education and awareness has lead to the formation of Environmental Education Councils in the UK and Australia (Roseland, M. 1992: 253).

The eradication of poverty and provision of shelter can be seen as one in relation to the built environment, the latter a component to securing the first. They are both part of Habitat Agenda Principles, and are strongly related to economic development. Housing is an example of how this goal may be achieved, not withstanding the lack of comprehensive and holistic thinking in housing procedure needed for sustainability. Overpopulation of urban areas, particularly in third world cities, developed urgency for provision of shelter. This and an increase of inadequate housing stock in the form of informal settlements and shantytowns, often make housing the most important issue to be addressed in development. WCED anticipates that, within 15 years, developing countries will have to increase ability to provide urban infrastructure, services and shelter by 65% (WCED 1987). Efforts must be oriented toward dealing with increases of population in order to achieve sustainable development.

Although provision of shelter contributes to the health of the inhabitants (a goal in itself), health is more related to provision of services and infrastructure. Health, being a major concern for UN related organisations such as UNESCO, has a strong role to play and is often considered with the provision of shelter as a means of providing basic needs to people. Provision of water, sewage, and electricity is one mean by which the built environment can meet and maintain health objectives. Increases in urban population increase the urgency for the provision of infrastructure facilities. Although it does not

entail particular changes to architecture, this is changing with the increase of recycling and the use of modern methods of waste treatment.

It is common belief of sustainability proponents that in order to achieve its' goals, encouraging the citizen, the family and local community to take responsibility is essential. Encouraging responsibility has evolved objectives, not only as a means to achieving the broader social goals, but as goals themselves that will enhance quality of life. The aim is not just to improve the environments in which people live, but to stimulate their involvement towards that end. Habitat identifies roles for the individual citizen and family in its principles. The citizen is encouraged to take responsibility and maintain an active role in building a sustainable community. He must attain political, and civic rights, and maintain active participation (Satterwaite, D. 1997). The family is viewed by habitat as the provider of social stability and the foundation for development of human settlement. One principle of the Habitat agenda is devoted to the family, recognising its significance. However the *community* is more a recurrent term in sustainability literature than the citizen or family. Although it has no particular principle dedicated to it in the Habitat, it is regarded as the focal point of many researches and of the international organisations. The aim is to find ways to make communities become full participants in the development of their surroundings. The community, empowerment and participation themes seem to be strongly connected where they are more often than not discussed together. Community is the basic working unit on which various concepts are applied. Serageldin lists *participation*, *empowerment*, and *social cohesion* (community cohesion) as social objectives of sustainable development (Serageldin, I 1993). In fact sustainable communities become synonymous with sustainable development, where it is used as an alternative (Roseland, M. 1992 and Judge 1995).

Cultural and social values are also recognised in the goals of sustainable development. They are a basis for social cohesion and stability, thus are essential for reaching social objectives. These can be achieved by sustaining cultural heritage in the form of architecture and important historic sites, thereby supporting other cultural activities such as festivals or the continuing production of old crafts facilitated in the built environment. The social dimension is the provision of these facilities that promote cohesion and *"where social and cultural values are met"* (Satterthwaite, D. 1997: 681). This entails provision for green areas, recreational facilities, and educational facilities

where such values are commonly practised. Cultural centres can play a vital role particularly in the case of minorities. Other important functions to be observed are religious institutions, which in many cases promote social cohesion. This can be found in Moslem cities in the Middle East, where the mosque is the centre for community action and in which decisions are often made. Parallels can be found within minority religious centres in the west and in Christian churches throughout the world.

Quality of life is one of the most used terms in sustainability as noted in the Habitat Agenda. It has therefore to be recognised as a goal, despite its generality and vagueness. The term can be used to include anything at all, whether this be a good or bad trait, and can be taken to include all social, economic, and environmental goals. Any objective that cannot be included in the previous will surely come under quality of life. This characteristic helps establish an inclusive approach.

Most goals, particularly social goals, have been induced by the UNCHS. The influence is caused by the high profile of the UN. All of the goals listed in **Fig 2.2** can be found in one form or another in UNHCS literature. However, research often takes a different course, producing a healthy and diverse body of literature that is still complementary to that of international bodies.

2.3.2 Economic Goals

The economic dimension of sustainability goals is recognised for its strong influence towards achieving sustainability as a whole. By accepting that the suggested underlying principal of sustainability is the sustenance of a quality of life, then people should be prepared to view economic (and environmental) goals and objectives in their ability to succeed. This means that economic goals are assessed according to their satisfaction of the social objectives. Serageldin (1993) points to a conflict between ecologists, economists, and sociologists in their view of sustainable development. However differences are often more evident between economists and other disciplines, often accusing each other of limited vision. Brooks (1990) highlights confusing sustainable development with sustained development and growth by many observers, not only economists (Rees 1993), since economic growth cannot go on forever. The economic dimension can be categorised into three major goals. These are achieving strong economic development, environmentally friendly economic activities; and a strong diverse and sustainable economic activity.

- Strong Economic Performance
- Sustainable Economic Activity / Industry
- Strong, Diverse, and Sustainable Economy & Economic Activity(for employment)

Fig: 2. 3 Economic Goals

A strong economy, the first economic goal, is of particular importance to Third World countries and poorer localities. In their case the attainment of economic growth will satisfy the second principle of sustainable development, that of *intra-generational equity.* In this light, sustainable growth for a foreseeable amount of time is a valuable goal for the underdeveloped nations in order to catch up with those developed. Similarly, due to the increased costs of restructuring needed to pay for changing to ecologically friendly practices, economic growth is needed. These arguments are put forward by economists advocating sustainable growth, namely improving the standard of living and paying for environmental protection. Economic growth has to address the more urgent problems of urban population growth, one of the most significant and persistent problems facing sustainability and which economic growth attempts to satisfy. This is particularly true of Third World megalopolis cities of which Cairo is a notable example. Population increases have led to pressures on providing shelter and adequate living standards (Gilbert, A 1994). As a consequence governments turn to economic growth as a process for development. This is a crisis control method where indicators GNP and GDP are the measurements of development, and indicate a lack of recognition of the broader issues. Job creation makes growth more attractive (particularly to politicians). It counters population growth, by creating wealth for governments to improve facilities, the outcomes of a strong economy.

In discussing the built environment, the economy can be viewed as a means for providing money to make more housing schemes and provide more facilities. Economists subscribing to economic growth create the false belief that cities can grow forever and still be sustainable (economic & urban growth go together). Realisation that an increase in urban growth of large cities is not sustainable is becoming apparent: *"very large cities are held by some commentators to be almost inherently environmentally unsustainable"* (Haughton,G.1994: 31). It is true that urbanisation is inevitable (McGee1994), however urbanisation can have different meanings to different people. It could mean the provision of good living conditions, as well as the maintaining of the natural environment. It must not mean just the provision of shelter and services and it should not cause climate change, and ecological destruction. These are the ill effects exhibited by megalopolis cities, but not necessarily of urbanisation itself.

Excessive increases in size are often accompanied by urban sprawl and increases in transport distances, therefore increases in car emissions. Other features may be a reduction of urban quality within city centres and the existence of slums, ghettos and general urban decay. Although this can not be generalised, these are more often than not the consequence of excessive size of the urban environment.

The second economic objective is the sustainability of the activity or industry. This is in essence the level conformity of the industry to other sustainability goals, whether they are environmental, social or even to the broader economic goals. Of course the most urgent role a sustainable industry has to play, it can become more at one with the natural environment. However social goals must also be identified. Geiser (1991) states the qualities that such an industry should have:

- Technologies appropriate to the desired ends;
- Safe and environmentally compatible materials;
- Products that meet basic social needs and some individual wants;
- Low and no-waste production processes;
- Safe and skill-enhancing working conditions;
- Energy efficiency;
- Resource conservation to meet the needs of future generations.

The first feature relates to the development of new industrial technologies that are environmentally friendly and non-pollutive. These technologies are still emerging. New technologies should use cleaner energy sources for production, produce less pollutive by products, and make recyclable products and by products that cause less waste. Geiser (1991) defines some social goals in the form of the quality of working conditions, and wider social goals in meeting needs and limiting wants. Other social goals that the economic activity might achieve are improving working conditions, and the home/work relationship which is significant on a social level in increasing free time and on the environmental level in reducing travel distances. Renner (1991) points to reducing the need for paid work, and Schor (1991) to the reduction of working hours.

The third objective of economic goals is the sustenance of the economy and economic activity. This refers to the level at which a local economy can be maintained, as expressed in maintaining local employment and community livelihood. This objective differs from the first, which attempts to create growth of the economy. It also refers to the kinds and forms of activities that are locally sustainable. It is usually identified with achieving local economic self-reliance. It aims at preventing community dislocation and

migration from one area to another or what Schumacher (1969: 50) termed "footloose". This objective is particularly important to this research as it relates to community control and the capability of self-reliance within communities to promote it.

Economic self-reliance is a growing objective in sustainability cited by many commentators. Morris (1990) advocates *miniaturising the economy* as a means to local economic self-reliance together with localisation of decisions, which seems to be inextricable from the notion of self-reliance in Morris's opinion. The benefits of community control are that decision making improves when the costs and effects of decisions fall on the same people. Morris also relates to self-confidence and security benefits of this. Bruyn (1987) identifies introducing economic diversity to local economy to achieve self-reliance. These counter national and regional dislocations and are, among other things, the result of the globalisation of the economy. This initiative has matured enough to identify methods and ways of achieving it. It endeavours to put as much power in local community hands as possible. Community enterprises and their variations are seen as striving to accomplish this. CDCs or Community Development Corporations are mostly notable in this area and aim to provide jobs in disenfranchised areas, and promote sustainable economic development (Roseland,M. 1992: 215).

Miniaturisation and self-reliance are strongly related to Schumacher's ideology. They have strong implications in the built environment, in that they can be integrated with other human activities, therefore reduce travel distances and enable the compactness of urban environment. As far as sustainable employment goes, among the proposed means to achieve this is the creation of jobs in new environmental industries such as recycling and waste treatment, characterised by being strictly local. However localities cannot restrict themselves only to recycling. Other proposed economic activities are the processing of local harvest for food and production of needs locally. CED, (Community Economic Development) is a proposed vehicle of employment, particularly in poor areas. The term refers to taking back some control from the state and the market place and giving it to the community, and in order achieve community goals and give economic stability to localities (Roseland, M. 1992: 218). Other similar initiatives are eco-villages that show qualities of community co-operation and control, some of which is economic control (e.g. Gaia eco-village in Denmark as well as other similar examples

of the eco-village network)[1]. It can be concluded that the third objective attempts to achieve the following:

- Community Self-reliance;
- Community Control;
- Community Organisations (CDCs);
- Sustainable Employment;
- Sustenance of Local Economic Strength;
- Economic Development and Management (EDM & CED).

Fig: 2. 4 Methods of achieving 3rd Objective of Sustainable Economy

2.3.3 Ecological / Environmental Goals

Ecological /environmental goals refer here to protection against the destruction of the natural environment. It was mentioned in the previous section that there are three distinct points of view toward what sustainability entails. The environmentalist concentrates on ecological goals, but also considers economic and social goals, although sustainability appears to be largely dominated by "pure environmentalist ideology".

Destruction of our natural environment can happen either directly or indirectly. Direct destruction refers to for example the destruction of the rain forests through logging, or for clearing the way for development purposes. The main cause of this is urbanisation, and urban sprawl. Increased urbanisation brings with it increased need for transport and roads. In this way the urban environment claims the natural through building development and through road construction. Development can therefore become a great threat to our natural environment directly. Similarly urban sprawl is a vehicle that accelerates this process. Many commentators have discussed urban sprawl and its effects such as Newman (1991).

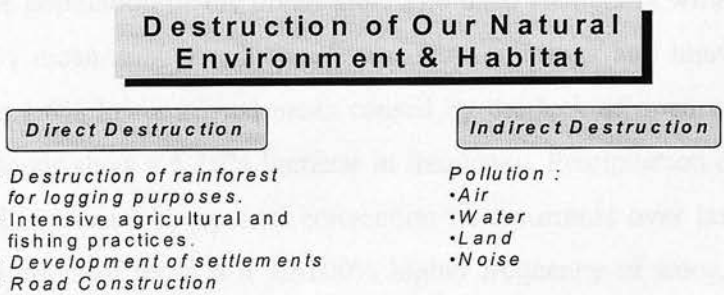

Fig: 2. 5 Destruction of Habitat

[1] The eco-villages network is a group of villages that are initiated with the primary goal of self-determination, and are documented on the World Wide Web.

Indirect environmental destruction refers to pollution, whether air, water, or land. Pollution can be divided into urban (settlement) and industrial. However industrial pollution is usually identified in the context of urban pollution, because industrialisation is invariably accompanied by urbanisation. In light of this, how economic activity is structured within the urban fabric is of importance to the reduction of pollution. Pollution, resulting from residential activities that are in the form of solid sewage wastes and gaseous automobile exhausts differ from the wastes of industrial activities often having highly pollutive by-products in liquid, solid and gaseous form including carbon oxides. Ultimately, the environmentalist aims to minimise if not eradicate pollution. For the purposes of this research, discussion of pollution will be focused on the urban context mainly. Pollution is found in three forms, air, water, and solid. Solid here refers to solid wastes and pollution of the land. They will be discussed through the three following categories.

2.3.3/1st Air Pollution

Air pollution caused by urban areas sparks major climatic changes to our atmosphere. Haughton (1994: 126) points to six forms of change in climatic elements over cities in mid latitude area compared with surrounding countryside caused by air pollution. The first is a decrease of 0-20% of solar radiation received at the ground due to the reflection of heat off air pollution in the form of dust particles and other air pollutants. The urban *heat island effect* more than compensates this decrease in temperature. The *heat island effect* is caused by the burning of fossil fuels for power generation heating of spaces, transport, human metabolism, capacity of heat storage of building materials, and lower wind speeds. This element causes a rise in the annual average air temperature of 0.7 °C and a maximum of 1.5 °C higher. It is notable that the urban *heat island* is proportional to the size of the population of the urban area. The third element is wind speed, which record a 10-30% mean annual reduction caused by buildings and uneven landscape. Humidity shows a 6% lower annual mean caused by the lack of open water and plant transpiration. Clouds show a 5-10% increase in frequency. Precipitation or rainfall is 5-15% higher and is caused by upward convection heat currents over large cities. The most significant effect of these is a 30-100% higher frequency of smog, which shows how closely pollution and urbanisation are related. These climatic effects are caused by a number of factors among which is air pollution.

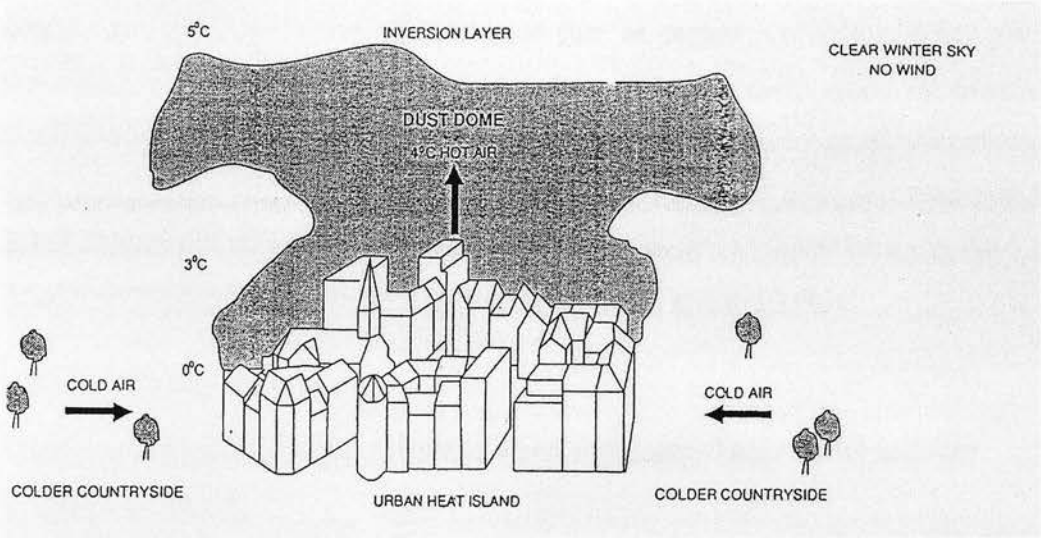

Fig: 2. 6 The Urban Dust Dome (Haughton 1994: 143)

Air pollution is mostly caused by what is termed traditional air pollutants. Those pollutants comprise:

1. Oxides of which the most notorious are carbon, sulphur and nitrogen;
2. Particulates which are in solid and liquid form such as soil, soot, metals, acids and pesticides;
3. Volatile organic compounds such as, hydrocarbons in gaseous and liquid form e.g. methane, butane, ethylene, and benzene;
4. Metals such as lead, cadmium, mercury, and arsenic;
5. Smog, a mixture of fog and smoke (including suspended particles) generally sulphurous or photochemical;
6. Noise pollution.

Carbon oxides are the most notorious air pollutants, regarded as the major cause of the greenhouse effect, where 90% of anthropogenic carbon oxides are caused by the automobile (OECD 1989). Particulate, however are caused by a number of activities including vehicle motion, heat combustion, building activities, stockpiling of materials, and by natural surroundings such as desert areas, and other miscellaneous causes. Sulphur oxides are mainly emitted as a result of anthropogenic causes rather than natural ones as in the case of carbon oxides. These causes are from fuel combustion, energy generation and, industrial purposes (Haughton1994: 137).

Air pollution causes a number of climatic changes. These are ozone depletion, the greenhouse effect or global warming, acid rain, and loss of forests. Ozone plays a crucial role in the regulation of ultra-violet solar radiation coming to the earth. Therefore its depletion has very strong adverse effects on human health and the ecosystem. It is predicted that 10% will be eroded in the next 50-75 years (Tolba & El-

Kholy 1992). The major pollutants causing this are CFCs (chloro-fluoro-carbons). The greenhouse effect or global warming, is just as urgent a climatic effect as ozone depletion. Although both are linked, one does not necessarily cause the other. Many greenhouse gases cause this affect, but carbon dioxide (CO_2) as a result of burning fossil fuels is the major cause. Other notable global effects are acid rains and deaths of forests due to increased pollution. A notable case is the weather cycles between the UK and Scandinavian countries thereby transferring acid rain across borders.

2.3.3/2nd Water Pollution

There are a number of major classes of water pollutants. These are as follows:

1. Organic wastes;
2. Pathogenic micro-organisms;
3. Radioactivity;
4. Inorganic chemicals and minerals (Haughton 1994: 175).

Organic waste comprises human domestic sewage, animal, and plant wastes and industrial waste such as pulp and food processing waste. Pathogenic waste is a consequence of human sewage and animal wastes. Radioactive waste is the outcome of nuclear energy generation or weapons testing. Inorganic chemicals are plant nutrients from agricultural run off and miscellaneous metals, acids, and salts. Heat is also regarded as a water pollutant and is formed in the cooling processes of industrial plants and power generators. All are diverse and wide ranging and caused by power generation, industrial activity, and urban wastes and sewage. They have varying effects on human health, plant life aquatic and marine life.

Sewage is a major contributor to water pollution, another facet of the effects of urbanisation. Adequate methods for sewage treatment are needed to reduce pollution of the environment and to prevent drinking water from contamination. Conventional methods of sewage treatment actually produce some toxic waste in the form of sludge and other chemicals. Better methods are being developed for sewage treatment which involve natural processes, such as artificial wetlands or marshes, and bogs; rock marshes; and solar aquatics (Roseland, M. 1992: 196). It is obviously extremely important to find appropriate methods in dealing with urban wastewater for its affects on our drinking water. This is backed up by OECD (1990) which points to the curtailment and rationing of non-essential water use in north-eastern states of the US.

2.3.3/3rd Solid Urban Waste

Solid waste is the third medium of pollution of our environment. North America is the most notorious example, where it is estimated that each individual generates five pounds of solid wastes daily, 90% of which ends up in landfill sites (Roseland, M. 1992). This huge capacity of waste pollutes the lands, and creates problems where to dispose of it. OECD (1990) points out that major initiatives will be needed to tackle solid waste problems in the future.

There are a number of methods to curtail this problem. Incineration is one, but it produces harmful emissions increasing air pollution. Waste reduction and recycling or other alternative initiatives are needed. Waste reduction can be seen in the use of recyclable products such as paper or bags, etc. If recycling and reuse are not taken up, the result is either incineration producing dangerous emissions, or landfill disposal where methane gases is a by-product. There are 12 principle categories of reusable goods, (Roseland, M. 1992: 171):

1. Reusable goods such as household goods and appliances, building materials, and industrial appliances;
2. Paper: publishing paper, newspaper, ledger paper, and cardboard paper;
3. Metals: cans, parts of abandoned vehicles, plumbing, and metal fences;
4. Glass: containers and window glass;
5. Textiles: upholstery and clothing;
6. Plastics: tire, containers, and beverage containers;
7. Plant Debris: leaves cuttings, shrubs, and grass;
8. Petrescibles: garbage, animal. Fruit, vegetable debris and offal;
9. Wood: lumber and pallets;
10. Ceramics: brick, ceramic, rock, and concrete;
11. Soils: excavation soil;
12. Chemicals.

It is important to establish ways to recycle these in order to reduce solid waste pollution. Recycling prevents such pollution. This seems to be a simple task when compared to problems of water or air pollution and their consequences in the form of global warming or inadequate water supplies. Nevertheless, solid waste pollution does contribute significantly to air and water pollution; a pollutant in itself that can be remedied.

2.4 Sustainable Architectural Forms and Methods

Researchers can devise principles relating to sustainability in the built form into planning, urban, and design principles. They can also be targeted into the three sustainability goal areas (ecological, economic, & social). Presentations of common methods that are intended to promote sustainability in one way or another follow in this

section. There are many initiatives that can be regarded as sustainability promoting. However, a number of these are more unique to achieving sustainability.

It is significant to note that old architectural ideologies can fit into the sustainability theme through their ability to improve peoples' lives. It is therefore important to be careful when linking architectural ideas and theories with sustainability. Sustainability has a number of distinct themes, where architecture can contribute, as follows.

2.4.1 Initiatives Associated with Sustainable Urban Form

2.4.1/1st High / Low Density

The question of density is a crucial one, particularly in countries that have shown strong signs of urban sprawl (US). This is one of the most discussed concepts regarding urban form and sustainability. Increase of density is directly proportional to the use of the automobile, the primary concern to sustaining the natural environment and achieving ecological goals of sustainability. It also means that there is much valuable time spent in commuting at the expense of social activities, negatively affecting the quality of life. However high density also has its critics who base their opinions on association of high population densities with antisocial behaviour such as crime, delinquency, and ill health (Michelson 1970). Such criticism is the result of the poor living conditions found at the beginnings of this century, more often the result of other factors such as unemployment and poverty, thus producing overcrowding. It seems that in order to achieve the right balance between high and low density it is necessary to experience the opposite extreme found in urban sprawl and very low urban density. Hopefully now a good balance can be struck which satisfies local conditions. Similar reasons are now given for a need for higher density as those that were given for lower densities, Paolo Soleri parallels crowding with life and death with lesser crowding; romanticising the need for higher densities. The Commission of European Communities recognises an absence of public life and monotony in periphery areas in contrast to high-density inner areas (1990). These features are particularly linked to North American and Australian settlements. It is suggested that this form of urban environment and sprawl is the result of a strong car lobby in the United States which advocates urban sprawl to increase car sales (Haughton 1994: 81).

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2.4.1/2nd Mixed Land Use

Mixed use and high density often go together as do sprawl and homogeneity of use. This is due to the evolutionary cycle that many urban forms have gone through. As a result of industrialisation urban centres grew in size to accommodate the labour needed. This industrialisation triggered shantytowns where form is of high density and mixed use. This scenario created opposition to high density and mixed use because of association with poor living standards. However, advocates of high density and mixed-use point not to this example but to the formation of relative high density and mixed use found in traditional urban environments. Such as those found in small towns and some inner city areas where social cohesion and a strong sense of community can be found. This form was replaced with a need to expand settlements fast with the introduction of large factories. This in turn meant that settlements were built like machines with workplace separated from homes and services (Walker 1981).

Both high density and mixed-use urban environments are options for decreasing the need for automobile transport, and therefore not only decrease gaseous emissions but also the need for road construction. They also achieve some social goals in that they create an urban vitality and promote social cohesion to some extent (Jane Jacobs 1961), in addition to increasing availability of time for social activities and community interaction.

2.4.1/3rd Urban Regeneration

Urban regeneration is a significant part of sustainable development that relates to built form. This is because it contributes to many social goals as well as environmental goals. Social problems in particular are found in the poorer inner city areas where urban regeneration and improvement of overall quality of urban life are needed. The Seattle Approach (Lawrence, G 1996) is a very notable example of the importance of achieving sustainable development in inner city areas. A comprehensive approach to the problems of these areas has many advantages. It often improves the quality of life for those who most need it, and while improving the standard of living. An urban regeneration initiative may address transport problems and methods of making public transport more attractive and therefore cutting down on gaseous emissions from car use. It may maintain local architectural styles and heritage and arrest their decline. Other benefits include reducing the need to create new settlements by improving the old existent building stock, in effect recycling old buildings and reusing them rather than resorting

to building new. This reduces building waste, a consequence of tearing down old buildings and at the same time minimises extra cost for infrastructure provision. In effect urban regeneration has the ability to be a holistic development plan much needed to improve cities, achieve sustainability goals and have a strong impact on areas with special needs.

2.4.1/4th Use of Alternative Energy Sources

The use of alternative energy sources to meet domestic energy demands is an urban goal that satisfies the environmental aspects of sustainability. Methods of achieving this are many and varied according to local resources and technological availability. Carmona, M (1996) lists the energy goals of urban design as:

- Use of passive solar energy through design, orientation, and layout;
- Use of renewable energy sources e.g. solar, hydro, wind, etc;
- Encourage use of natural light;
- Encourage use of natural ventilation;
- Encourage energy conservation;
- Prevention of Heat loss.

In building design it is not invariably true to state that use of alternative energy relies on advanced technology, because the effective use of natural light and air ventilation relies on the skills of an architect or designer sensitive to their benefits. Traditionally, uses of natural light and ventilation have effectively been used in buildings all over the world. This makes the reuse of old methods an easier task. Technological advances have however created ever more effective methods of the use of alternative energies, such as; wind, sun and hydroelectric power. These coupled with effective design can cause significant impact on domestic use of energy.

2.4.1/5th Co-operative Neighbourhoods and Housing

These refer to a number of initiatives that give more control to inhabitants than they would otherwise enjoy. They are also meant to improve community cohesion by increasing shared facilities and control, therefore creating a shared purpose. Such initiatives concentrate on improving social aspects of sustainability. Common facilities are parking areas, community house, nursery, and common backyards instead of a division between private and public domains. Examples of these are found in the work of shared living resource centre (Norwood 1990). More established concept can be found in co-housing developments particularly in Denmark where there exists a culture of co-housing. Co-housing has four basic features:

- A participatory process over the design and planning of the project;
- Intentional neighbourhood that encourages a sense of belonging to place;
- Extensive common facilities;
- Complete resident management, (McCamant and Durrett 1988).

Other similar examples are the creation of neighbourhood forums (Wates,N & Knevitt,C 1987: 25) and the Kibbutz in Palestine (Israel) (Sharon, A 1976).

2.4.1/6th Street Calming and Road Reclamation

Such initiatives can contribute to both social and environmental goals of sustainability. The main aim of them is the discouragement of car use, particularly in residential areas, and reclaiming areas for social activities rather than transport accessibility. Street calming methods are used in varied ways of which decreasing road width and creating twists and bends while establishing green spaces and seating in the reclaimed areas (Philip,H Lewis 1996). Reclaiming road areas is another option that achieves the same objectives more effectively. In this case larger areas can be made available than can be used for public parks and amenities. Other uses include making greenhouses and urban gardening projects for farming high quality foods (Philip,H Lewis 1996) and possibly the formation of playgrounds or nurseries.

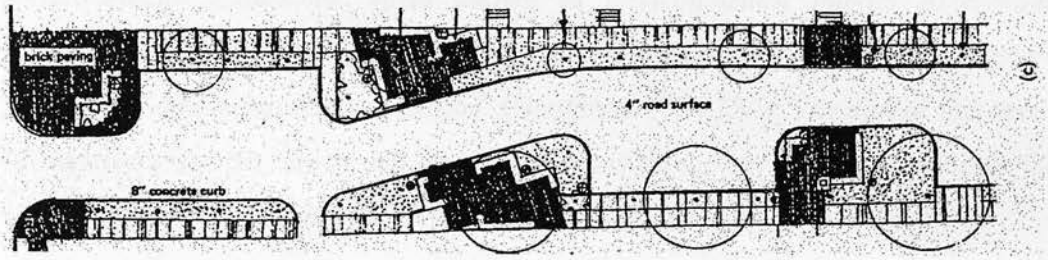

Fig: 2. 7 Street Calming (Philip,H Lewis 1996:143).

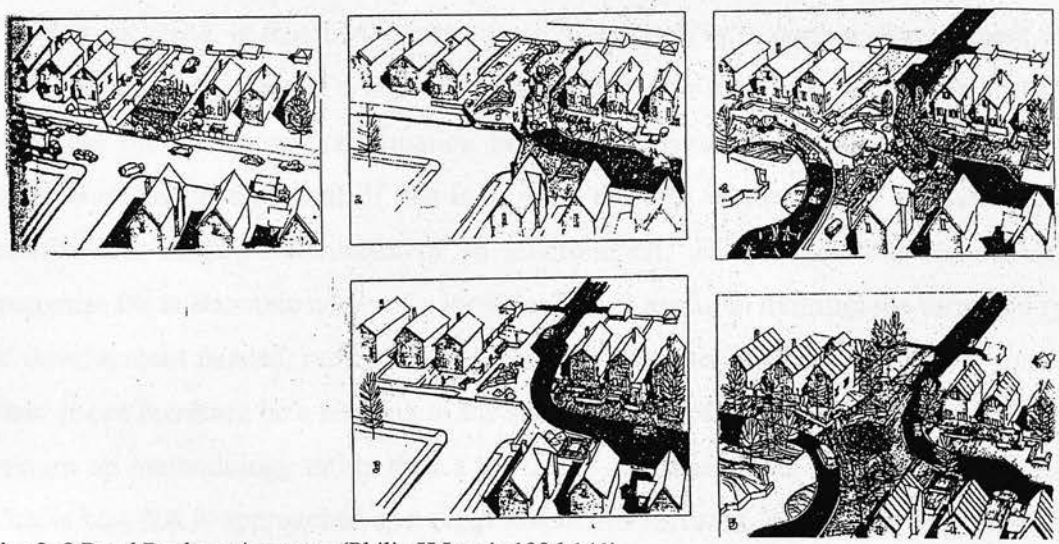

Fig: 2. 8 Road Reclamation areas (Philip,H Lewis 1996:141)

2.4.1/7th Other Architectural Methods and Objectives

There are a number of objectives relating to sustainable urban form that cannot be seen as a distinct initiative for change on there own, nonetheless they are significant in their contributions to a sustainable form and cannot be included under any of the last headings. Carmona, M (1996) lists a number of these under different titles:

- Encouraging the appeal of inner city areas significantly reduces the need for sprawl and preserves architectural heritage;
- Preserving architectural distinctiveness;
- Relating development to existing infrastructure in terms of roads and amenities;
- Density related to nodal points to ease access and make efficient use of existent services and amenities;
- Design for pedestrianisation and environmentally friendly transport such as cycling;
- Exclude non-essential traffic and minimise parking space;
- Rehabilitation rather than redevelopment;
- Designing for recycling of garbage;
- Use of recycled building materials;
- Encourage robust building forms;
- Reduce run-off water with permeable paving and natural channels.

2.5 Environmental Assessment

Environmental Assessment (also known as *Environmental Impact Assessment*) is regarded as an integral part of sustainable development meant to *"translate principles of sustainable development into practice*" (Haughton 1994:239). The aim of this section is to identify a system which can be used to measure the level of sustainability that an environment shows, so that it can be used later in the case study for evaluation.

A difference between Environmental Impact Assessment (EIA) and Environmental Assessment (EA), is that EIA is seen as an assessment of a certain development plan such as the construction of a highway. EA, on the other hand, can be seen as a method to assess the environmental situation before development and perhaps the potential impacts of the development. If this is in mind then EA can be a way of assessing the positive and negative attributes of an environment, while improving the ability to recognise the sustainable needs of a locality. This is useful in defining the form and type of development needed, rather than merely assessing the impact of an already existent plan. It can therefore be a reaction to the sustainable needs of the locality and become a bottom up methodology rather than a top down centralised one (Haughton 1994: 239) This is how EA is approached and suggested in this research. Basically it can be used to assess conformity to broad sustainability principles already identified in literature.

EA is commonly used to assess the impact of suggested large-scale development. A common example of this is the building of highways. The building of a large oil refinery 30 km north west of the Taj Mahal and near the city of Mathura in India is a notable example (D'Monte 1985). In this case the decision to base the plant was made according to the availability of infrastructure. However, with the knowledge of the direction of prevailing winds and the nature of the air pollution it was made apparent that damage would come to the Taj Mahal and local residents in the case of the suggested location. In such a case a need of conducting an EIA is apparent. The EC[1] put forward a list of projects requiring an EA. These are:

- Crude oil refineries;
- Thermal power stations;
- Installation for radioactive waste;
- Cast iron works;
- Installations for the extracting and processing of asbestos;
- Integrated chemical works;
- Construction of motorways express ways and lines for long distance railways, and airports;
- Trading ports and inland waterways;
- Waste disposal installations.

Fig: 2. 9 EC Directive for project requiring and EIA (Haughton & Hunter 1994: 246).

The typical EIA statement or documentation is called the ES or *environmental statement*. This contains four main sections (Selman,P 1996): non technical summary; methods statement; background of proposed development; and topic area coverage. And these include:

- Land use, landscape and visual quality
- Geology, topography and soils.
- Hydrology and water qaulity.
- Air quality and climate.
- Terrestrial and aquatic ecology.
- Noise.
- Transport.
- Socioeconomic.
- Interrelationship between effects.

Fig: 2. 10 Criteria included in EIA (Selman, P 1996:121)

Similar to Selman, Glason (1993) adds social-cultural effects/ lifestyles, quality of life, social problems, and community stress conflict. They both mention social and quality factors as one indicator. This demonstrates that EA does not give enough attention to qualitative factors, as does the UN in its declared sustainability principles. It also shows that care of local community needs does not yet hold enough significance.

[1] European Commission

2.6 Proposed Environmental Assessment

The proposed use of EA in this thesis recognises local sustainability in its broad sense of attaining better quality of life (including social, economical, and environmental goals), rather than a specific development impact. Any EA should also assign weights to the suggested indicators or criteria. This can be done through a questionnaire where a local community can recognise areas that are lacking in the environment and their significance. However, local criteria must not be the only ones to assign criteria and their weights. Global sustainability criteria and their relative weights must also be found, as they might not be recognised locally. This is to say that sustainability is both local and global. This in turn is more evident with environmental ecological criteria than the economic and social (qualitative) criteria, because pollution is often global and crosses boundaries. The end form of the proposed EA will be compiled at the beginning of the survey section of this research in Chapter 7 and applies sustainability indicators as identified by the UN and in literature while recognising local criteria. Local criteria are identified in the case study through open-ended questions of the samples of the survey.

2.7 Participation / Control and Sustainability

The role of people and the community in sustainability has been afforded much effort. These efforts have been channelled into a number of methods of increasing people's participation. The term participation, often used in sustainability literature, refers to a limited amount of community involvement. Selman states *"participation by the public is seen to increase legitimacy of the planning process, lead to the production of better informed decisions, and raise public interest in planning matter"* (Selman, P 1996: 123). These objectives seem to be in effect levels of tokenism rather than a real increase in community control or empowerment.

Arnstein (1969) provides a very notable method for observing citizen participation. He observes three degrees of citizen participation (**Fig: 2.11**). The first is non-participation. This is the classical approach of planning, where the professional knows all and is charged with *therapy* and *manipulation* of the environment and its residents. The second level he describes as degrees of tokenism, using methods like, placation, consultation and information. This is the level that is most commonly advocated for use today in literature sustainability. The third level, which although not used commonly, is recognised. It comprises of citizen control, delegated power, and partnerships. The first

term is less common, while delegation of power and partnerships are usually mentioned more than truly applied. It also refers to decentralisation and a lower level of accountability that is closer to the citizen. Selman (1996) notes that the ladder demonstrates that there is much more scope for invention to take citizen involvement seriously.

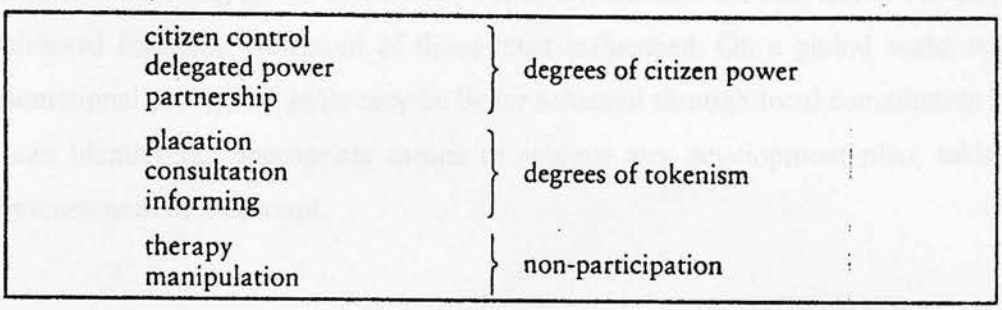

Fig: 2. 11 Levels of Citizen participation (Selman, P., 1996:121)

Boothroyd (*et al* 1994) observes that most of the decisions are made at the municipal and local level and that it is at this level that action and decisions are more manageable, relating to the UK experience. Fischer and Forester (1993) see the role of the locality as the arena for consensus building and consultation.

Hague (1997) notes that *"substantial restructuring of professional thinking about how to plan urban development, even a negation of traditional perceptions knowledge and skills"* is represented by the Habitat Agenda, which is what is taking place in a gradual manner. Differences between *orthodox planning* and *Habitat Agenda* planning are six as mentioned by Hague (**Fig: 2.12**). These are methods of control, decision-making, organisations involved, design and management, role of the experts, and gender awareness.

Orthodox Planning	Habitat Agenda
Regulation and Control	Enabling Development
Hierarchy of plans provides top down centralised framework for decisions.	Decentralised, bottom up basis for decisions.
Presumes State has power and acts in the public interest.	Partnerships with NGOs and private sector
Design of finite plans	Governance and Management
Professionals as experts with right answers	Professionals as enablers and partners in dialogues
Gender blind	Gender aware

Fig: 2. 12 Orthodox planning and Habitat Agenda (Cliff Hague 1997)

Despite all that sustainability attempts to achieve, larger community involvement still falls short of actual empowerment and community control. Although these are mentioned, they are rarely really accepted except in some crises areas (post war reconstruction- Motawef, S 1997). However working with sustainability at a local level and community participation (not to mention control) is part of the same approach. The benefits of focusing on the community are that it clarifies the real issues that have to be addressed from the viewpoint of those most influenced. On a global scale, achieving international ecological goals may be better achieved through local consultation because it can identify the appropriate means to achieve any development plan, taking local circumstances into account.

CHAPTER THREE
System of Control

3.1 Foreword

The objective of this chapter is to contribute to a deeper understanding of the processes that take place inside a local environment and their implications on built form. This is done through application of *General Systems Theory* (GST) and *Structuralism* concepts. The study recognizes two distinct configurations of systems that determine form. The first is seen in a human ecological context defined by people and their ability to determine the built form in which they reside. The second are those practices that are devised by architects, planners, and decision-makers. Both have contrasting qualities and exist in parallel although one is usually dominant. Systems approach helps to model the mechanisms by which these control transformations in local form and will be identified in the course of the chapter. A representative model will be introduced for the community in which the structures of human activity and their interaction with the natural context produce a holistic built environment. In order to do this, system concepts will be identified in both.

This approach stresses holism and may seem difficult to comprehend by many that are strongly influenced by an education system built on reductionist methodology and thinking (Grene, M. 1974). Wholeness (an integral part of the systems approach) can be traced from as far back as Aristotle *`the whole is more than the sum of the parts`*. The scientific revolution of the seventeenth century that has prevailed until now has dictated a modern perception of the world that neglects wholeness, causing negative effects on communities which are reflected in today's built environment. A need for structured systems understanding by designers is put forward by Lozano,

> *The notion of systems is diametrically opposed to the instinctive approach of most designers, who tend to see descriptively rather than structurally. Understanding the systematic nature of urban complexes requires a true change in mental attitude, but it would allow for a far more powerful and effective intervention by designers that would upset conventional solutions, interpretations of urban crises, and meanings of urban order.*
> (Lozano, E 1990: 74).

It is therefore necessary for designers to understand the nature of the phenomenon and the problems they deal with before attempting to forward a solution. At the same time there is

a process of transformation of power within any system whether this is an organic or an artificial man-made system. Within each, powers of control will be allocated to different parties. It is the purpose of this chapter to identify the domains of control within the different systems that affect the local environment. These comprise inherent control as found in organic social systems; and as is in the case of artificial systems modelling, a system of control that is defined from the outside. The following section will introduce the two systems theories, *General Systems Theory* and *Structuralism* and their concepts.

3.2 General Systems Theory (GST)

General Systems Theory emerged from as far back as the 1940s in the writing of A.D. Hall, in *`Definitions of Systems, General Systems`*, in the field of engineering. Yet, the concept accelerated at the hands of *Ludwig Von Bertalanffy* (1971), a key figure in the history of the general systems theory movement. The movement is a method to achieve a deeper comprehension of a natural phenomenon, and to enhance the ability to model according to the objectives of man made systems.

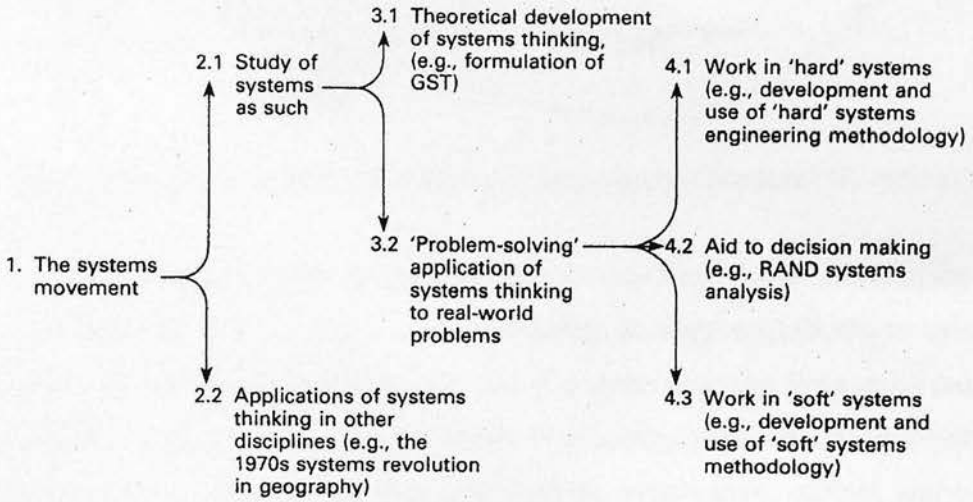

Fig: 3. 1 Distinctions in systems thinking concepts (Checkland, P.B. 1981: 39).

GST did not emerge as an independent science on its own but developed in parallel in various disciplines. It attempts to integrate problems of organised complexity through holistic thinking. A systems approach has consequently appeared in biology, economics, philosophy, and engineering all in parallel. Each contributed in different ways towards the general theory, developing several aspects to an apparently universal logical model. An important distinction made is that between systems devised for decision making and

procedural determination, and those intended only to represent and enhance our understanding of a phenomenon. This is observed as hard/soft systems (see below. p.71), and those used to aid decision-making (**Fig: 3.1**). It is particularly significant to the objectives of this research.

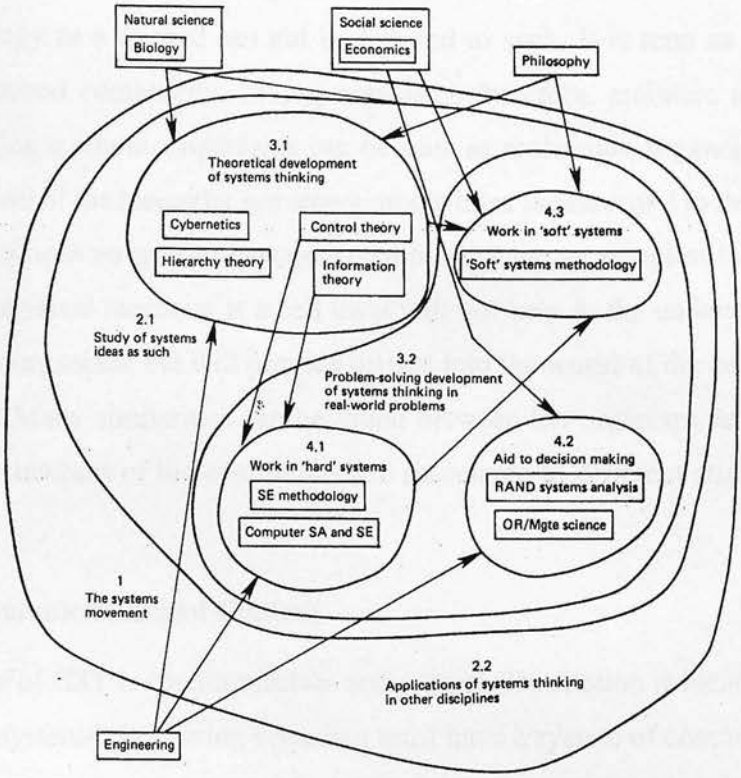

Fig: 3. 2 Contribution of different disciplines to systems theory (Checkland, P.B. 1981: 41).

The different sciences where systems thinking emerged each contributed to the various systems concepts that constitute the theory today. Biology contributed to cybernetics, hierarchy, control, and information concepts of systems thinking. Economics contributed to soft systems and decision-making methods. Engineering contributed to hard systems and decision making, and philosophy to soft systems, information, control, and hierarchy theories (**Fig: 3.2**). On the whole, GST relies on a number of basic concepts that encompass hierarchy, control, information flow and communication.

3.2.1 Cores of GST Thinking

P.B.Checkland (1981: 31) argues that systems theory is based on two core ideas. These ideas are *emergence and hierarchy*, and *communication and control*. Both these cores will be found in the majority of cross-disciplinary applications of GST.

3.2.1.1st Emergence and Hierarchy

This deals with understanding phenomenon in hierarchical layers. It attempts to look at problems of complexity in terms of wholes. Biology accelerated this understanding, where in spite of the fact that all living organisms obey the mechanistic laws of physics and chemistry, biology as a science can not be reduced to such. It is seen as a hierarchical system of organised complexity. Living organisms therefore, maintain a hierarchy of structures creating a whole. Organisms can be seen as molecules, organelles, cells, and organs. Each level of the hierarchy has emergent qualities fundamental to the higher level, but at the same time there are non-emergent qualities that are meaningless to higher levels. Chemical and physical reactions at a cell level will not help in the understanding of the functions of the organism, but will provide insight into the world of the cell (Checkland, P.B. 1981: 32). Many similarities can be found between the organism and community, where social hierarchies of the community are associated to different strata of the built environment.

3.2.1.2nd Communication and Control

The second core of GST is communication and control. This notion is identified in living and man made systems. Any living organism must have a system of communication and control in order to survive. Existence of communication means there is information to be transferred. This is reflected in our senses of vision, smell, hearing and touch, each of which relay detailed information to the brain through the neural system, the vehicle of communication. Another reflection of information transfer and communication is DNA, which has the capacity of storage and coding of information that is transferred to the next generation of organism. Communication of information would be obsolete if the organism were not able to act on this information. Acting on information implies a mechanism of control recognised in the human body's neural network, which relays information to organs to take action. This is the control mechanism whereby the brain maintains the rest of the body's vital functions. Communication and control can be more obvious in the man made systems such as machines and industrial plants. The term controller is used for a small device that regulates the operation of machines. This device can be found in washing machines or vacuum cleaners. The machine is a system and the controller a vital part of that system. *Cybernetics* (a more complex form of communication theory) on the other hand, are used in more sophisticated machines where there is larger need for communication and

control of information. The term is specifically related to robots where a sophisticated system of information transfer and control is even more vital.

3.3 Structuralism

Structuralism is the natural succession to GST. At the same time this does not mean that the two philosophies do not have areas of conflict. Some of the GST concepts are the basis for structuralism thought. It is associated with the figure of Jean Piaget who state that *"a structure is a system of transformation"* (Piaget, J 1971:5). It is oriented towards enhancing understanding applied in the social fields where GST is inadequate. Structuralism defines itself from GST through emphasis on the time dimension. Structuralists advocate *"space-time, not three-dimensional synchronous space"* (Hillier, B. 1973: 65) in their approach to architecture and those who inhabit it. It made its major advances in the disciplines of language, mathematics, psychology, social science and anthropology. Darwin`s theory of evolution is a common example viewed as a structuralist approach. The idea of diachronic transformation through history rather than synchronous self-regulation is where structuralism makes its mark. The use of structuralist concepts is not suitable in instrumental systems of planning because they are not living organisms and because changes in them are a result of a decision making and not a natural progression. The use of the concept in this research is primarily to enhance understanding of social and community systems.

3.3.1 Core of Structuralism Thinking: Wholeness and Structure

Structuralism like GST stresses wholeness and holism. Piaget differentiates structural wholeness from that of GST in defining a structure as a, *"system and not a mere collection of elements and their properties"* (Piaget, J 1971:7), thereby contrasting a structure with *a set of aggregates*. Structural wholeness is therefore the aggregates or component elements and the laws holding and binding them together. These laws are those governing the transformation of the system from one form to another more suited to its changing environment. Structuralism stresses processes of transformation, rather than internal relationships between the components of the systems. It strives to identify a system's purpose, to which all its internal relationships become secondary and subordinate in satisfying that aim.

3.4 Two Systems that Shape the Local Environment and it's Built Form

There are two configurations of systems that have a strong role in shaping the built environment. The first is the social or community system, which by instating cultural norms and physical needs define form. The research attempts to draw an understanding of local environment as a system, where the people who inhabit it play a vital role. This understanding can be found in number of approaches in the fields of human ecology, cultural ecology, and anthropology. How this understanding of the local environment affects built form will be discussed while identifying systems concepts. This basic understanding of the local environment is advocated in this research because of its organic inclusive nature. The second configuration is instrumental systems that are laid down by decision-makers, planners and architects alike to deal with the complexities of the urban environment. The term *instrumental* is taken to relate those methodologies used to fulfil the particular objectives of the system designer. Instrumental systems are installed for two reasons, to support decision-making or to lay down a procedural framework or plan of action. It is important to mention that planning systems[1] are the more influential in shaping the built environment than architectural ones, and therefore are more representative of instrumental methods in this research. Both instrumental and social systems can be identified in most local environments where one may have a more dominant role to play in determining urban form. They are both configured differently in terms of decision making and the parties that define them. This configuration in terms of powers of control is what distinguishes them from each other.

This chapter attempts to draw an understanding of local environment and instrumental systems and observe their internal functions as well as their affects on built form, while taking into account the transformation of control within them. In so doing it will be possible to assess their potentials towards the built environment. The first will be referred to in this study as the local environment system and is taken to include natural, man made and social aspects; and is more representative in organic vernacular settlements. The second will be referred to as the instrumental system, and it can be representative of the formation of more contemporary settlements. These will be observed in the functions of control and the case study application during the following chapters.

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[1] Planning systems can be identified in procedural flow charts.

3.5 Interaction between State and Local Community System

Instrumental systems that attempt to manage and regulate the local environment are tools of the state. State or government is a body that can be recognised as distinct from the local environment or community (Friend, J.K., Jessop, W.N. 1969: 237). In modern societies of today, the state takes over many of the functions and responsibilities that were once in the hand of local communities. The state perceives the local community as an entity that has to be organised and managed centrally, not as a viable entity that has the ability to maintain itself and satisfy its own needs. This perception leads to increased centralisation whereby the state takes over many of the functions that were once local. Friend (1969: 237) recognises the existence of these two systems that shape the local environment. Depending on the case one of these will be more dominant, where at the same time there is a process of interaction between them. The local community only has a consultation role to play for feedback in the eyes of the state. The planning process regulates form, assesses user needs and satisfaction, initiates development and produces economic strategy among others roles; many of which can be undertaken by the community.

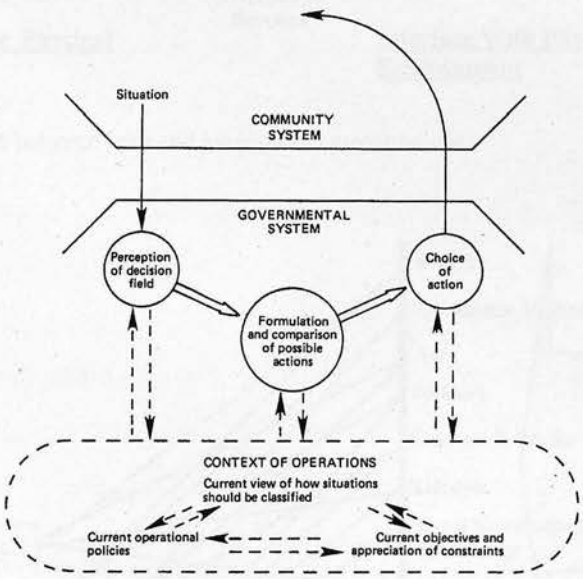

Fig: 3. 3 Interaction between state and organic community system (Friend, J.K., Jessop, W.N. 1969: 239).

3.6 The Local Environment System

3.6.1 Understanding Man / Environment Relationship

The first relationship, which this research wishes to establish, is that between man and his physical environment. As discussed in Chapter 1, the local environment system consists of

three components: the physical environment, which includes both man-made and natural, and the population that inhabits it. We can observe the relationship between man and his physical surroundings in a simple form by identifying his basic needs from his surrounding environment (**Fig: 3.4**). At the most immediate level, these must be food and shelter. Eating off the land and finding accommodation in the naturally sheltered topography satisfied these basic needs. The land provided food and shelter in the form of caves or possibly under trees. During the course of a learning process, the natural resources were made use of. Through a process of interaction with the natural physical environment, adaptations were established through acquired knowledge and behavior.

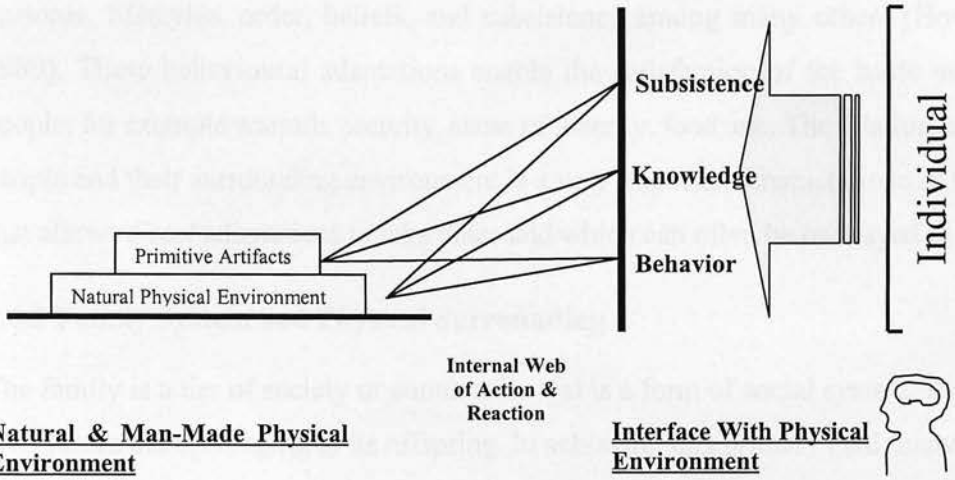

Fig: 3. 4 The adaptation between man and his physical environment.

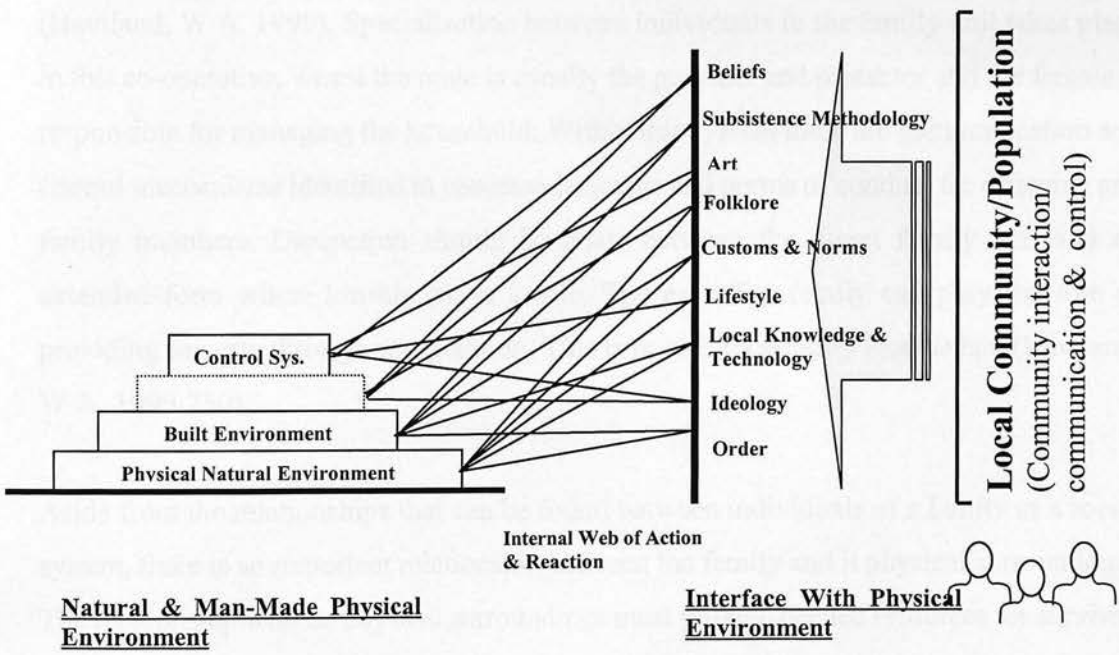

Fig: 3. 5 The local environment system; inhabitants, natural & man-made physical environment.

A native environment is more complex than the previous example. It has a multitude of components and consists of many individuals. In this system there must be organisation and specialisation among the inhabitants and more complex methods to adapt to the physical environment that they inhabit. Competition among individual members of the community forces higher forms of organisation and co-operation. This process is termed as '*Density Stress*' (Brugmann, Jeb: 1992). This organisation appears in the adaptations that a local population has to make in order to survive and sustain its lifestyle (**Fig:3.5**). Adaptations can be both physical and behavioral. The behavioral adaptations are the interface between the population and their physical environment. They appear in the form of ideology, customs, lifestyles, order, beliefs, and subsistence among many others (Howard, M.C 1989). These behavioural adaptations enable the satisfaction of the basic needs of the people; for example warmth, security, sense of identity, food, etc. The relationship between people and their surrounding environment is a very important characteristic of this system that allows direct adaptations to take place and which can often be portrayed in built form.

3.6.2 Family System and Physical Surrounding

The family is a tier of society or community and is a form of social system. Its basic goal is to secure the upbringing of its offspring. In achieving this primary goal many secondary ones need to be achieved, like the provision of food and shelter. Anthropologists observe the family as a necessary co-operative that maintains the survival of its individuals (Haviland, W A. 1990). Specialisation between individuals in the family unit takes place in this co-operative, where the male is usually the provider and protector and the female is responsible for managing the household. Within this system there are communication and control mechanisms identified in common language and norms of conduct for offspring and family members. Distinction should be made between the direct family unit and its extended form where kinship plays a role. The extended family can play the role of providing security through co-operation. This is in effect a security mechanism (Haviland, W A. 1990:230).

Aside from the relationships that can be found between individuals of a family as a social system, there is an important relationship between the family and it physical surroundings. The relationship with its physical surroundings must provide needed resources for survival. In this context the home is a reflection of this relationship. It provides shelter and warmth and areas were vital social functions can take place.

3.6.3 Social Groupings and Community

Different forms of social groupings are the next levels of the social system above that of the family. They can vary in size and definition. A group of neighbours is a social group that is larger than the family unit, yet small in size, and is not bound together by kinship. It can be identified as those people who inhabit a street or neighbourhood. Another social group is community[1], and can be seen at a higher level than the group of direct neighbours. Each level is characterised by the sharing of common facilities of built form. The larger the group is, the more organisation and specialisation can be identified. At the same time, there are fewer common goals and qualities that bind individuals together. Emile Durkheim identifies an *organic solidarity* of social systems where,

> *the social structure of societies assumes many of the characteristics of an organism. Like the organs of the human body (heart, lungs, brain and so on), the parts of such a society function in specialised ways, each contributing in a different way to the functioning of the society as a whole* (Durkheim quoted by Howard, M.C., 1989: 167).

Durkheim links specialisation of functions with the increase in size of the social group. The specialisation of functions is an apparent indication of the capability of social groups to reach more complex organisations and systems. Such specialisation appears in the different roles of individuals within the society. For example, clergy men, tradesmen, and builders, each of which adapt to their local environment, forming within it one system of transformation. This specialisation may be identified in the different functions found for built form (e.g. mosques, shops, squares, etc.). Individuals not only adapt to other members of the group, but to their physical surroundings (**Fig: 3.5**).

3.7 The Built Environment: a Hierarchy of Built Form

The following section observes different components of the built form as systems reflecting their functions.

3.7.1 The Home

Parallel to the tiers of the social system, there is a corresponding hierarchy of built form. At the lower end of the scale is the home that must correspond to the needs of the family unit. The primary function of the home is the provision of shelter, while warmth and security are secondary functions.

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[1] Definition of community within the context of this research was established in Chapter 1.

In order to satisfy the needs of those who live in the home, a number of physical, social, and cultural functions are met. In so doing the home becomes a system. An example of this is the circulation system, consisting of halls and corridors. Within the home there is differentiation between private space such as bedrooms, against common spaces such as kitchens and bathrooms. Circulation and spatial distribution embody cultural and social qualities of the household (Massaud, M. A. 1997). Privacy is an important quality of eastern domestic architecture. At the same time, form must also represent the identity of those who live in it and of place (Amin, M. K. 1994). Spaces may be allocated differently across different cultures; for example the existence of a separate dinning room area is found more in the West and less in Eastern cultures.

The home does not only embody the social and cultural needs of those who inhabit it but physical ones also. In order to satisfy many of the secondary basic needs, those other than provision of shelter, there must be a provision of a basic internal infrastructure. In so doing there are a number of internal subsystems in the form of electrical, sanitary and water supply facilities. These can be seen as subsystems of the home, working to satisfy the occupants' secondary needs. The structure system of the built form is the vessel in which all other functions can take place. Although, understanding the home as a complex system may seem to be an overstatement to some, the identification of its various functions (many of which have not been identified here) will allow it to be better understood.

3.7.2 The Street

The street is at a higher level of the hierarchy of built form and can be understood in a similar light as the home. It has the primary function of providing access to property. At the same time it has secondary functions in satisfying the needs of those who use it. These needs can be social, cultural and physical. Streets in old urban environments in the Middle East are often used for other functions than merely access. They provide a space where social interaction can take place. Often *mastabas*[1] are located along streets (Akbar, J 1988: 75). In Egypt they can be used as an area facilitating cultural activities such as the holding of weddings or for celebrating religious festivities. The street needs to physically adapt to these functions, and does so through user conventions. The form of the street and use of street furniture for sitting areas, green spaces, or electrical lighting; will enhance or

[1] A built up bench on the sides of a street where the owner of a property sits and socialises, See Chapter 4.

discourage social functions. Physical functions are found in the provision of infrastructure to satisfy access to services of adjacent property. In some cases parts of streets may be used to display goods to passers-by and therefore to satisfy an economic function.

The street therefore satisfies the primary need of providing access to property; and at the same time it satisfies social, cultural as well as physical secondary functions. However, the local street must be recognised as part of the overall street network. As such it becomes a system of access for both people and infrastructure services like electricity, water, and sewage disposal. It becomes a system that regulates flow.

3.7.3 Neighbourhood / Village / Town

The neighbourhood represents a higher level complexity in comparison to the street. It is an extended street environment, and more central amenities are allocated to it. Such may be a number of small shops or a playing field. A village or small town however will show more central and specific functions and satisfies wider needs of those who live there. These central functions can be found in educational, recreational, health, and administrative facilities. The street network will also have more central elements, in the form of roundabouts, squares, bridges, or tunnels. Infrastructure services that are provided locally will become central elements of the urban fabric derived in power and sewage plants. An urban settlement in the form of a town or village embodies subsystems of infrastructure and road network, while having at the same time vital central organs such as a hospital or school. The urban environment then becomes symbolic of a body, having both internal networks and central organs, reflecting an organic nature.

3.8 Systems Theory Uses in Architecture and Planning

The following provide examples of the uses of systems theories in planning and architecture.

3.8.1 GST Uses in Architecture and Planning

GST is used in architecture and planning as a decision-making method and as a procedural framework for plans of action. Its applications vary depending on the objectives of its use. Applications in architecture differ from those in planning and those used in the building industry.

In relation to architectural design GST can be used to simulate the design process, and define the different procedures and stages to arrive at a design solution (**Fig: 3.6**). These stages may include defining the goals and objectives of the design, gathering of information, and the assessment of design alternatives. GST may also be used in the design of large projects that have complicated circulation networks, such as that of the design for an airport. In this example there are many circulation routes; those of passengers, airport personal, commuters in the form of taxis and buses, and aeroplane routes. The large influx of people and vehicles that use the facility mean there is a need for perfect synchronisation. Cueing theory, which is based on system analysis used to assess time spent in cues, is applied in this case. Systems applications are also found in building using prefabricated components, where it is used to define the procedure and components needed to execute the built form. Systems methods used in project management to determine the time and procedure for project execution is another significant GST application. These schedule finance, arrival of materials on the site, and overall execution of a project.

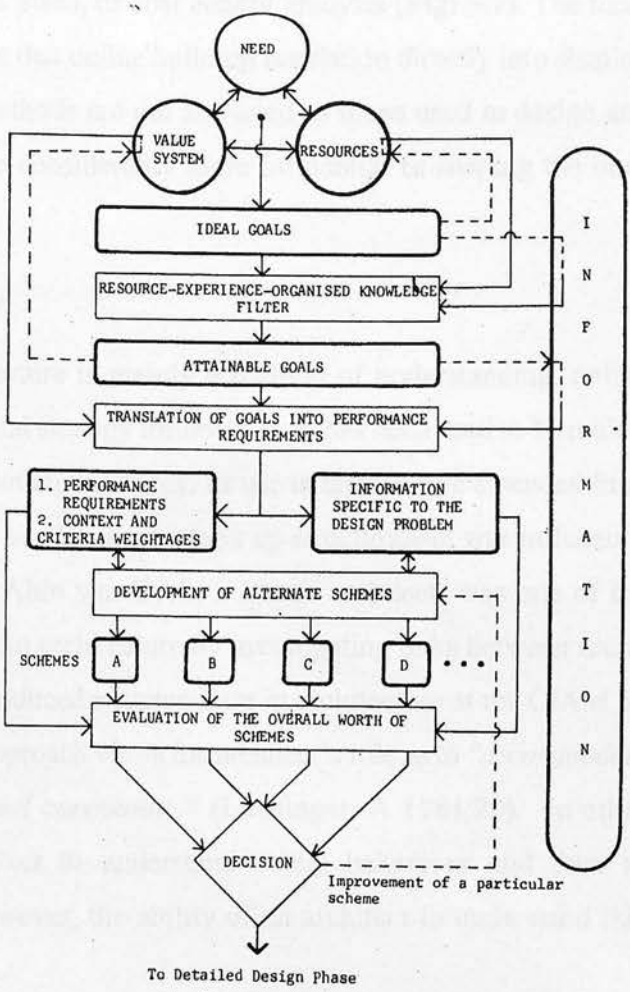

Fig: 3. 6 Systems approach to design (Ferguson, F 1975: 52).

The second area in which system methods are used is in planning. This is a very important area of application because of the strong influence of planning in shaping the built environment. The planning system lays down procedures for granting planning permission. They are also used to assess planning strategies in relation to a list of chosen criteria and will attempt to define public preferences, assess public pressures, the financial viability of

different plans, the creation of action plans, or cost benefit analysis (**Fig: 3.7**). The most influential planning systems are those that define building regulation directly into shaping form. Although planning systems methods are not as varied as those used in design and execution of the built form, they are considerably more influential in shaping the built environment.

3.8.2 Structuralism in Architecture

The structuralist approach in architecture is mainly a method of understanding, unlike GST's instrumental uses in decision and strategy formulation. It has been used to formulate architectural theory and understand human behaviour. Its use in architecture extended from its application in anthropology. Aldo van Eyck who took up structuralism was influenced by the anthropologist Levi Strauss. Aldo van Eyck, a Dutch architect, was one of the foremost to introduce structuralism into architecture by investigating links between social structure and built form. He first introduced structuralism in architecture at the CIAM 59 in Otterloo (Newman, O 1961). His approach views the architect's role as to *"accommodate the archetypal behaviour of the social community."* (Luchinger, A 1981:20). In other words, it is the role of the architect to understand social behaviour and then to accommodate this in built form. However, the ability of an architect to understand this archetypal behaviour is questionable.

This structuralist approach to architectural design differs from viewing the built environment as a structure in itself. Accepting this approach, the social systems and the built environment they occupy, are actually organic entities that transform their surroundings to meet their needs. By enabling this natural process to take place, then it would be possible to accommodate the archetypal behaviour that Van Eyck refers. The role of the architect in this case is to precisely accommodate user needs according to the user and not according to the designer's personal vision.

3.9 GST Concepts Identified

GST concepts are too many and varied to be covered in a single chapter of this research. The research instead will concentrate only on concepts which assist in modelling the internal process that take place in both *instrumental* and *the local environment systems*. Definitions of the concepts that are in italics are taken from the Open University, Systems Behaviour 3rd edition (Peters, J 1981).A comparison will be made in the forthcoming

section between both configurations, bearing in mind Open University definitions.

3.9.1 Systems Boundary, Hierarchy and Systems / Subsystems

System Boundary: *" The conceptual division between a system and its environment."* (Peters, J 1981: 17)

This division is relative to the intentions of the observer, and not necessarily to any physical or non-physical reality. A boundary may correspond to recognised geographical, legal, cultural, political, or economic characteristics. It will indicate the location of the entity within the overall hierarchy of its environment, and the relationship with neighbouring elements. These relationships between different systems can be symbiotic, parasitic, or competitive.

In instrumental systems of planning, boundaries are defined by the system designer. The identification of a hierarchy and boundary depends on the complexity of the design and design objectives. Within the procedure of planning, subsystems can be identified in land use or transport planning policies. In the execution of large projects, subsystems can be seen in the transfer of materials and labour on and off the site, which must correlate with the finance as a subsystem of the project.

In the *local environment system*, hierarchy, boundary and subsystems are more easily observed. Subsystems are identified in society, the natural physical environment, and the man made (built environment). These are not designed to the purposes of a system designer, but are a reality that can be observed. A society or community has subsystems of economy and cultural activity as well as clearly identifiable hierarchies. A population of people residing in a particular location reflect a nested social hierarchy starting from the individual, to the family, neighbours and then overall community. In parallel the built environment is a hierarchy that ranges from the home to the neighbourhood to the settlement and to the city or town. Within the overall environment, there are natural subsystems of plant and animal life and of human activity. In comparison with *instrumental systems*, boundaries of the *local environment system* are *'fuzzy'*, yet are identifiable (Aberley, D 1993 & Alexander, Y 1996).

3.9.2 Communication and Control

Communication and control mechanisms in the planning process have been relatively primitive (Ostrom 1986), but have improved with advances in GST. Communication mechanism is related to the flow of information through the system and from outside it. This may come in the form of gathering information about the location to be developed and those who live in it, a cycle of information flow from outside the system. Information will flow concerning the opinions and decisions from different elements from within the system, for example the feedback given from local authorities. The application of a plan of action represents the internal control mechanism. The execution of the planning project is the practical result of that control mechanism (**Fig: 3.7**). Cybernetic process, an advanced form of communication and control, is attempted in planning (Aulin A, 1986). However, cybernetic processes seem to be too complex, while self-regulation is more representative of planning information flow.

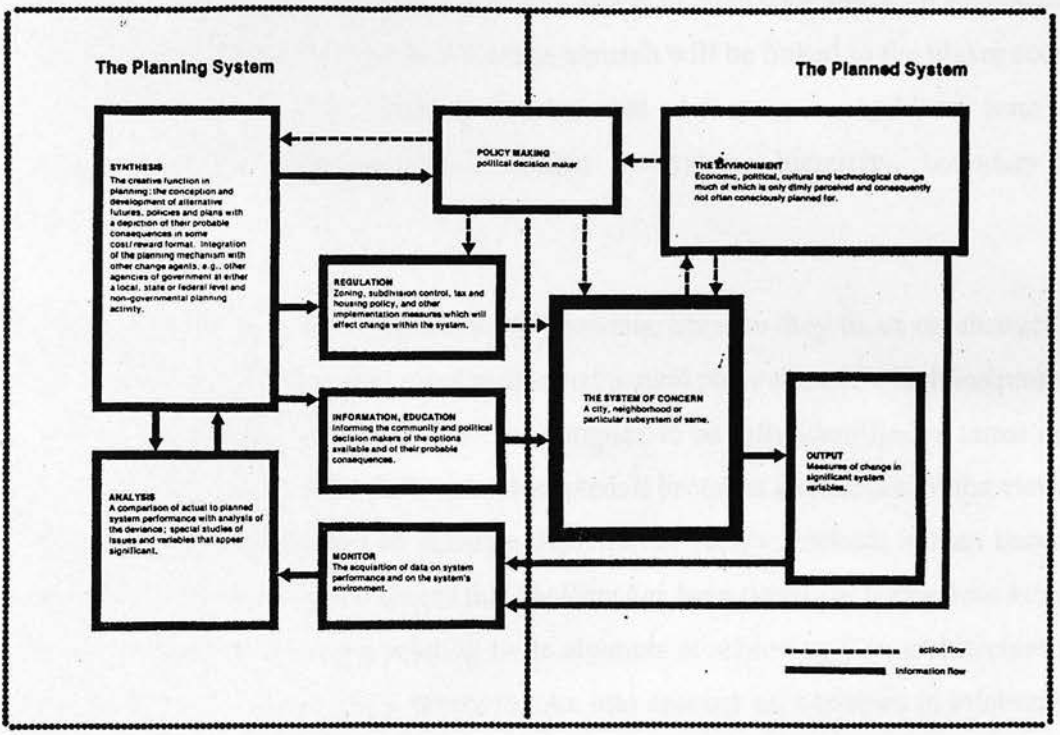

Fig: 3. 7 Communication and control mechanisms in a planning system (Ferguson, F 1975).

Within the *local environment system*, the medium for communication and control is people. Through language and social interaction communication is achieved. Socialising then becomes a very important form of information transfer. This information transfer at the same time enables the control mechanism of the system. If the community or group of

people decide to take action, for example to clean up their neighbourhood, this will be first discussed socially or possibly in a community forum. A plan of action is put forward and then executed. In this case the communication and control mechanism can be much faster than that of planning systems. Decisions can be made and executed faster because there is minimal bureaucracy. Often forums are established by the state in order to measure public opinion. They are also used to increase community co-operation, at the time enhancing communication and control mechanisms (Wates, N & Knevitt, C 1987).

3.9.3 Holism

Theory or doctrine according to which a whole cannot be analysed without residue into the sum of its parts, or reduced to discrete elements.
(Peters, J 1981: 17)

The term is used to imply viewing a phenomenon as a whole as opposed to a reductionist analysis of a single component. One would try to find how the system as a whole reacts instead of generalising according to actions of a single isolated component. In a reductionist perspective, the success of a football team in a match will be linked to the player scoring the winning goal. Holistic thinking dictates that victory is a combined team and management effort. This concept is related to systems hierarchy, boundary and homeostasis.

Holism cannot be identified in instrumental systems, because they focus on abstractions from reality. As such it is important to realise that natural phenomenon, which instrumental systems try to manage and replace, are too complex to be fully identified in terms of all their internal functions. When holism is attempted, it becomes a reflection of the views of the systems designer and not an accurate depiction of reality. Instead, holism becomes relative to objectives. Feguson claims that *"hollism has been pervasive throughout history"* (Ferguson, F 1975: 28), when relating to its attempts at achieving it in architecture and planning. They do not have the ability to take into account all variables in relation to a particular plan; instead those most relevant to objectives are often recognised.

In the *local environment system*, holism is a natural characteristic. The internal structure of a social system adopts holism in the purest sense in all its processes. This is made possible by the ability of the human mind to conceive all elements and subsystems of the environment in which it inhabits. Collectively, and as a result of the accumulation of the

individual capabilities, a community or social system acquires a holistic internal structure throughout its processes. This can be substantiated if we observe multifunctional processes that can take place. For example, if we observe a community gathering for a particular cultural occasion. It has already been demonstrated that it can serve the communication and control mechanisms of the social system. It can also serve to further cohesion between the community members and to further their identity. It may associate with a place to meet prospective partners. It can also serve as a religious function, or to serve as an economic function where the buying and selling of goods could take place. Levi-Strauss, the founder of French structuralism, sees social interaction as a system in which "*all aspects are linked to one another*" (Levi-Strauss quoted by Luchinger 1981:16). This link is a true representation of holism in social systems.

3.9.4 Open / Closed Systems

An open system is that connected to, and interacts with, its environment.
A closed system is that does not take in from, or give out anything to, its environment.
(Peters, J 1981: 17)

Open / Closed systems identify themselves by existence or non-existence of exchange between the system and its external environment. In practice a closed system cannot exist, but can be assumed in the case of negligible exchange. Closed / open systems are linked to the concept of closed / open loops. A closed system, in order not to interact with its environment, forms a closed loop. Cloud formations, through plant and animal perspiration, and evaporation of water from lakes that return moisture back to earth in the form of rain constitutes a closed system. Taking into account cloud motion from one location to another exemplifies the impracticality of viewing this as closed and that it is in fact open.

Instrumental system methodology can either be closed or open. Its transformation from early less sophisticated methods to more advanced ones was paralleled by a change from closed to open form. Interaction and exchange with the surrounding environment makes a system open. Interaction with the environment is in the exchange of information and knowledge. The kind of information that is exchanged varies considerably. A planning system will tap into economic, financial, social, and technological knowledge from experts. It is able to do this because of the availability of resources, which allow for long expensive tasks of data gathering in the form of surveys. Surveys attempt to measure public opinion and determine the demographic qualities of chosen samples. The system is not only open

to transfer of information, it is also open to public opinion, economic pressure and political policies, all of which it should recognise and attempts to satisfy.

The local environment system is naturally open to interaction with it surrounding environment. Individuals living in the system will make use of the resources found in their surroundings to satisfy their needs. This can be seen in the use of different materials for shelter depending on what is on offer in the surrounding environment. People living in the north build using wood. In much of Africa, where timber is scarce, mud is used in old indigenous settlements. If the social system is not isolated, resources may be acquired from beyond the immediate surroundings. This may be seen in the use of reinforced concrete often not found locally. The social system seems to look more to the inside than it does to the outside. This means it will use what it has on offer locally before looking further hence and emphasis on local knowledge first. That is why indigenous communities try to maintain local methods. This may indicate that the system has a tendency towards becoming closed. This is not entirely true. It attempts to build on gained knowledge and methods while slowly adapting to the existence of new resources found in new methods and materials. This can be seen in Egyptian villages that have slowly adopted new methods in building to satisfy their local needs[1].

3.9.5 Goal Seeking Systems

A system that can respond differently to events until it produces a particular state (outcome). This system has a choice of behaviour.
(Peters, J 1981: 17)

Any system will have at least one goal. As it increases in complexity, the number of goals will increase, although a single primary goal should be identifiable in any case. In order to achieve this primary goal, secondary goals and objectives may need to be met. The idea of structure found in structuralism parallels the identification of a single primary goal, where the structure of the system attempts to satisfy it. In this way depending on the complexity of the system, a hierarchy of goals can be identified.

Goal identification in instrumental systems of planning can be part of the actual system. The system may attempt to define the needs of those affected by a development plan for example. Often in the case of action plans, the goal is just to execute a particular

[1] This is further discussed in chapter 6, and in the case study.

development strategy or policy within financial limitations. Typical planning system goals and objectives will include economic development, time of execution, finance, total cost, provision of housing and employment, reducing car emissions, or improving public services.

The *local environment system* will differ in the identity of the goals. Each individual in the system strives to satisfy his / her basic needs. Since the community is the collective of the group of individuals that belong to it, then the social system will strive to satisfy the needs of the community group. This satisfaction of the total number of needs is in fact an attempt towards achieving a primary goal of improving on the quality of life of those living in that system. In striving to achieve this primary goal, the human ecological system achieves as many secondary goals and objectives as possible. These can be many and varied, but can include provision of food, shelter, and health; practically this means housing for shelter, employment for food and necessities, and health in satisfactory living conditions. Although these goals can be found in the instrumental systems, there are many that are not identified because of their number and the inability of instrumental systems to become holistic.

3.9.6 Hard / Soft System

Hard systems are man made, defined, and structured physical systems where significant variables are of quantifiable nature.
Soft systems are real life natural systems that are abstracts of reality and of a lesser susceptibility towards quantification.
(Peters, J 1981: 17)

This differentiation corresponds in a direct way to the difference between *instrumental* and the *local environment systems*. The hard system is conceived and designed in totality, and has the ability to become quantifiable, while the soft system is only an abstraction from reality to enhance understanding of some natural phenomenon. All planning and architectural systems have to necessarily be hard, because they are designed.

Any social system has to be soft because it does not emerge from design. Use of systems theory to investigate it aids in understanding but not in controlling it. Recognition of this difference is apparent when observing the building process today. Detailed planning of the project must take place in order to fulfil the task. This task includes a number of different roles, from the architect to the builder, whereas before the institutionalisation of the

building industry, the process was much less planned and the building process was subject to different levels of success without the benefit of a predefined system to control it,

> *Thus, Eliel Saarinen could say the medieval master builder was an intuitive master who simply knew (he felt in his bones) how to put the stones together to create his architecture and, by extension, to build his cities.*
> (Ferguson, F 1975: 1)

3.9.7 Entropy

A form of energy represented by the degree of order in which matter is arranged.
(Peters, J 1981: 17)

Negative entropy is the increase of level of organisation and the ability of a system to transform resources. Gaining negative entropy becomes a positive quality. Entropy is related to information transfer, and open / closed systems concepts. The level of order of a system is related to the openness of the system to information. In the closed system, entropy is the tendency that leads to the cessation of the system, because of its incapability to adapt to the external environment due to lack of information.

Hard instrumental systems tend to be closed; this will generate positive entropy yet risk its obsolescence and decay. Information plays an important role in instrumental systems. Depending on the strength of the internal processes of information transfer, the system can continue to function. Problems may arise in the planning system if information is not regularly updated. There should therefore be a continuous cycle of information exchange in order to maintain the system. Failure to do so in a planning system can occur when it fails to respond to new changes in people's needs and the ability to identify their problems, thereby causing public dissatisfaction.

In the local environment system, information exchange is found between the social subsystem and its physical surroundings. This represents information exchange from within the system. At the same time the local environment system as a whole shows information exchange with other surrounding systems. This may be in the form of trade of goods, or through the use of natural resources such as rivers and lakes. Kast identifies the benefits of this exchange thus in: *"the social system, entropy can be arrested and may even be transformed to negative entropy - a process of more complete organisational ability to transform resources."* (Kast, F.E. & Rozenweig, J.E. 1970:50). Entropy enhancing exchange does not only include information, but materials and energy also. The ability to

adapt the internal organisation according to changes in the environment is important to any system. Social systems have therefore a large potential for negative entropy.

3.9.8 Feedback / Feedforward

The modification of a variable, process or system resulting from its own effects or outputs. (Peters, J 1981: 17)

Feedback is a form of information transfer between a system and its external environment. In the case of feedback, it is part of a continuing process of adjustment to information and external stimuli. It is part of the communication and control ability, which is a cause / effect mechanism. Negative feedback is the term given when information from the environment indicates the system is deviating from nominal action and that an adjustment is needed. Positive feedback therefore indicates that the desired course is being taken. Feedforward is the opposite of feedback, it is a *response in anticipation of a discrepancy from a desired course.* Feedforward consists of putting action into the environment instead of taking information from it. The feedback concept is important to keeping equilibrium and stability in a system and works towards the process of homeostasis a process that will be discussed below.

The concept of feedback is accepted in planning systems. Feedback can be a method of obtaining information from the environment or community in question. Although feedback can be identified, feedforward is seldom incorporated. Feedback in planning can be seen as negative (requiring change) or positive (not needing change). Surveying those influenced by a planning course of action is a feedback mechanism.

The ability of a social system to demonstrate feedback or feedforward can be more apparent. The speed of a community in co-operatively responding to a local fire exemplifies this. Language and word of mouth enable the transfer of the information and control mechanism to overcome such a problem. Because feedback and feed forward are triggered effects requiring speed, such a contingency demonstrates the ability of a community to embody this concept. Strong communication and control mechanisms in the social system enhance this mechanism.

3.9.9 Homeostasis

The maintenance of a system in a relatively constant state in a changing environment. (Peters, J 1981: 17)

The achieved constant that this concept refers to is in maintaining the vital internal functions of a system, and not its ability to adapt to the external environment. Feedback and feedforward are instruments for achieving a state of homeostasis. This concept can be displayed in both natural and man made systems. The human body's ability to regulate a constant body temperature despite changes in external temperature exemplifies homeostasis. The body achieves this through a complicated process of adjustments part of which is the burning of fat. The more sophisticated examples of homeostasis are bases of the transformation process on which structuralism is based.

Instrumental systems are not complex enough to have an internal homeostatic quality, and do not interact with the environment to receive enough information. This quality can be identified in the local environment system seen in the local subsistence that maintains the livelihood of those living in it. The trade of food and goods maintain the existence of needs within the environment on a daily basis. Any shortages in a particular good will trigger off internal adaptations through the use of local alternatives, or by freeing stored supplies.

3.9.10 Equifinality

This is the concept by which a system can achieve same final results through different initial conditions and through different routes
(Peters, J 1981: 17)

Equifinality is the existence of numbered solutions, each having its own qualities as by-products of the final state achieved. This concept is in opposition to the widely held notion that there is only one best way to achieve a given objective, a point of view found in closed systems methodology. The concept is taken in management of complex organisations, social systems and biological systems. It accepts the existence of numerous yet varyingly successful routes to achieve required objectives. It takes into account existence of a changing and varied array of resources that can be manipulated and organised in different ways according to their state, and still achieve similar goals.

Equifinality is found in management and in some planning systems. Often different alternatives can be identified in a prospective development plan, each of which is assessed for its advantages and disadvantages. In the local environment system, this concept can be represented because of the system's organic nature. For example to roof a house there

might be a number of possible solutions through the use of timber, corrugated sheets or concrete. Each will provide appropriate shelter, and each has its own inherent pros and cons.

3.9.11 Adaptation

An adaptive system is a system that has the capacity to modify its internal state or structure in response to changes in environmental demands or opportunities.
(Peters, J 1981: 17)

Increase in sophistication of communication and control subsystems will enhance a systems adaptive capability. Information theory and cybernetics are concepts that deal with increased sophistication of communication and control mechanisms, and therefore are integral parts of an advanced adaptive system. For a system to adapt, it must have the ability to interact with its environment, necessarily becoming open. Adaptation is associated with negative entropy and openness. Biological evolution, individual learning and social systems are all examples of adaptive systems. The adaptive system, in order to achieve its defining quality, must become more complex and sophisticated. As it achieves more complexity, it becomes goal seeking and reaches degrees of self-consciousness.

Adaptation in a planning instrumental system is not as evident or established as it is in the social system. Lack of adaptation in the planning systems is noted by Friend & Jessop claiming *"planning must become to some degree an adaptive process."* (Friend, J.K. & Jessop, W.N. 1977: 243). As discussed, the planned system is less open to the direct physical environment and has fewer interactions with it, thus reducing the systems ability to adapt to it. We can identify a planning systems ability to change according to public pressure as adaptation, but this is usually not in the formal structure of the system. A form of adaptation as identified by Friend (1977) is that of anticipation of future needs, which can be identified in planning extrapolation of the future needs of a community. Cultural and physical adaptation of the social system will be examined later in this chapter.

3.9.12 Optimisation /Sub-optimisation: Sub-optimality Actions and Spillover Effects

Optimisation is devising a means of meeting the largest possible combination of ranked goals.
Sub-optimisation is the property of finding a less than best solution.
(Peters, J 1981: 159)
Optimisation of a system is achieved according to a set of criteria allocated by the system designer. To achieve it in man made systems, it is crucial that the system can become

quantifiable. Optimisation is reached when the system is able to fulfil a number of predetermined goals. Sub-optimisation is when goals are not properly executed and when there may be concentration on one goal neglecting others. It is associated with not taking an adequately holistic approach to problem solving, especially when dealing with living systems, biological or social system. This concept is more evident in hard rather than soft systems.

Looking at any system as a combination of subsystems we can observe the effects of over stressing the importance of one subsystem above others (subsystems being themselves systems with their own internal components) when problems arise elsewhere. In understanding a system and trying to improve it, one must look first towards the larger whole of which it is part before looking inwards towards its subsystems. Stressing only on internal subsystems is referred to as a sub-optimising action. Subsequently, resulting effects are called spillover effects i.e.: uncalculated effects due to the failure to recognise a broader and more holistic view of events (Ferguson, F 1975: quoted Charles J. Hitch).

> *Sub-optimisation occurs when a decision maker seeks multiple goals involving multiple subsystems as opposed to a single objective. In short it is an endemic to urban problem- solving.*
> (Ferguson, F1975:6)

> *An interesting example of sub-optimisation in urban problem solving is provided in the history of transportation planning in New York City. There, transportation planners have historically viewed their decision-making role as one primarily directed at the ordering and ultimate optimising of New York's transportation system. In accomplishing this, the planners have implicitly, and sometimes explicitly, discounted the effect of transportation subsystems optimisation on other systems of the city, specially those of a social and economic nature. By definition they became sub-optimisers. This perception of role, for example, resulted in the advocacy of the often suggested, often rejected, lower Manhattan expressway. In pushing for this project, the advocates simply discounted the `spillover effects` of their optimising activity upon other subsystems, for example, the Jewish, Italian, and Chinese communities in the lower eastside and the small merchants along canal street. In addition to community fragmentation, many businesses would have been driven out of the area had the expressway gone through. The systems analyst would conclude that the planners, in seeking optimal conditions for a particular subsystem (transportation), created negative spillover effects on the social and economic subsystems because of an implicit discounting of consequences in the decision making process.*
> (Ferguson, F., 1975: 6).

This example can examine the use of the instrumental systems idea as applied in the social and urban environments in cities. In spite of its strength in analysis and decision making

processes, it fails to put into context all implications of an urban environment. It would be impossible to conceive a system that would account for all components of the urban environment thus enabling a successful decision making-process. Although the planner is striving towards a systems approach that would be holistic and enable a successful decision-making process, will he ever reach it? Can he engage all functions and subsystems into his system? The smallest subsystem, when neglected, proves vital and ultimately surfaces into a spillover effect. This may substantiate allowing social systems to manage their own environment.

The belief in an ability to optimise an urban environment towards stated ends, seriously questions the rationality of the decision-maker and the decision making process. The ability of the systems designer to produce an effective systems approach is in question.

> *The systems analyst's reasoned approach to problem solving is premised upon an objectivity in viewing problems. While there is no doubt that this is serious in most instances, there are substantial questions as to the possibility of objectively viewing social phenomena; such objectivity often appears to be a positivist illusion or a utopian hope.*
> (Ferguson, F 1975:15)

Loss of rationality in the urban environment is caused by its complexity and the impracticality of objectively modelling it. This does not mean that people should not attempt to alter and improve the urban environment, but maybe that it should be treated as a living entity and by using less intrusive ordering methods. We should nourish it to adapt and improve in its own way, rather than mechanise its internal functions.

3.9.13 Decision Making / Control

The decision-making processes in any system are important. They determine the allocation of powers of control within the system. In the local environment system, decision making is inherently internal of that system, although this sometimes does not occur at the appropriate level of the hierarchy relative to the user. Decision-making in instrumental systems is inherently an external body of the affected environment it attempts to organise or shape. Decision-making and control are well-recognised parts of instrumental planning systems. This is because the system is designed to take decisions, and must have the ability to execute them. Instrumental systems also allocate powers of control to different parts of the system itself (W C Baer, 1997). These will include planning departments, local councils, and affected individuals; each having different powers. We can therefore observe

instrumental systems, as decision making systems that have the ability to allocate power, yet being dislocated from the environment and the artefact they address.

3.10 Systems Concepts of Structuralism

The following relates to systems concepts of structuralism and their observation in relation to built form.

3.10.1 Wholeness and Structure

As previously stated, structure and wholeness in the structuralist viewpoint can be understood aggregates and their governing laws. In the community social system this can be easily identified in cultural norms, laws, and practices that govern the individuals of the community (the aggregates). This structure is orientated towards achieving its primary goal of improving quality of life; achieved through codes of conduct, or subsistence methodologies or building methods. Acceptable and unacceptable codes may be observed in the context of wasteful uses of natural resource; such as for example the prevention of overgrazing in pastoral communities. Codes of conduct differ between different cultures. Eastern societies are perceived as more conservative than Western ones. Similarly, urban life is seen as more liberal than rural life. These codes were perhaps triggered off by many internal adaptations appropriate to their own environment. All these codes are part of the interface of people with their natural environment in the local environment system. In instrumental systems, wholeness and structure as identified in structuralism are not identifiable.

3.10.2 Self-regulation

Self-regulation is the structuralist equivalent of homeostasis in GST. Since GST is a more instrumental school of thought in contrast to structuralism, self-regulation is a more complex notion than homeostasis. Self-regulation, reaches a higher level of complexity to include *"self-maintenance and closure"* (Piaget, J 1971:14). Self-maintenance implies a larger time span possibly generated by increased complexity, and not a lesser cause and effect mechanism. An example could be a defensive approach adapted by one animal against another to preserve its well being. The term *closure* implies that such a system is a closed loop system, and not an open interactive system implied in transformation. It is a cyclic and rhythmic operation, which may be activated externally or be ongoing (e.g. blood flow through the human body).

The difference between self-regulation and homeostasis can be observed in larger complexity through the application of time. Homeostasis in GST may apply to a thermostat. Structuralism would refute such a simple mechanism to represent self-regulation. An example provided by Lozano (1994: 78) concerns the fluctuation of property prices in the urban environment. Increases in property prices typically lead to an increased need for development in particular locations, and therefore a requirement by the state to develop more land. This process originally sparked by price increase, then causes upgrading of utilities from infrastructure (street lighting, water supply, etc..) and services (schools, healthcare, etc...), and then to an adjustment of tax revenue accordingly.

3.10.3 Transformation

It is the constant duality, or bipolarity, of always being simultaneously structuring and structured.
(Piaget, J 1971:10)

According to this definition transformation is an ongoing process of change in form. The difference between transformation and self-regulation is that transformation entails causing change to internal structure (presumably for the better), while self-regulation is concerned with maintaining the overall system. Transformation can show similarities with adaptation in GST, while stressing a deeper process of change where time is a defining factor. Self-regulation maintains the system in the face of changes in environmental condition, while transformation is essentially adaptation and reorganisation of internal structure. This reorganisation might be understood, as a change needed for a system to be able to better respond to changes in the environment. This change may be in the form of the restructuring of the self-regulatory subsystem.

Transformations of the social system has been discussed previously in relation to adaptation. The transformation of the local environment system can be seen in the evolution of building techniques and methods over a period of time. The *arch* and the *vault* are examples of transformation and evolution of an architectural element through time. Changes made to their form and structure are recorded across geographic location as well as time. These elements have adapted to the environment they were used in, mostly seen in the materials used to form them (See Chapter 6). This adaptation occurred through builders, who were part of a *local environment system* and the social systems in which they

participated. This transformation process can only be found in natural processes and not an instrumental designed hard system.

3.10.4 Synchronic and Diachronic Transformation

Synchronic: Concerned with the events of phenomena at a particular period without considering historical antecedents.
Diachronic: of, relating to, or studying the development of a phenomenon through time historically.
(Hillier, B. 1973)

These terms reflect structuralism's deep pre-occupation with the concept of time and its role in systems that had to be clearly defined. Darwin's theory of evolution can display these systems concepts. In it synchronous transformation will be seen as responsible for the evolution of a variety of bird species on an island. Although this is identified as structural transformation, a deeper form of transformation can be identified in evolution. This is diachronic transformation. It governs species families in the bird kingdom that evolved over a much larger time span, allowing variety in a single species. Synchronic and diachronic transformation then correspond to a surface structure and deep structure inherent in the system. Any system could include both forms of structure (Hillier, B. 1973).

Both kinds of transformation can be seen in the changes that take place in architectural form through time. The courtyard house has existed from ancient times to today. It has adapted both periodically and throughout history. Today it has reached its current form, where typically there is extensive use of reinforced concrete that allows for roofing systems that do not rely on vaults or domes. Yet it still maintains many of the characteristics of older courtyard houses. During different time periods, synchronic transformation is seen in the variations in form and structural materials of the domes and vaults and the layout of the house. In transforming itself diachronically through history, it retains some characteristics found from the beginning of its existence, namely the court, while adapting other characteristics. This transformation process would not exist if it was not undertaken through the applications of people as part of a holistic system, therefore able to interact and adapt successfully to its surroundings and needs.

3.11 Summation of Systems Concepts Applications

The previous applications of systems concepts to both the instrumental and the local environment systems were intended to enhance an understanding of both these systems.

Analysis indicates that the local environment system as defined, is a complex natural system that can exemplify most systems concepts. This is not true of instrumental systems because instrumental systems are designed to a purpose, therefore systems concepts defined in them depend on the purpose and intention of the designer. Another reason is because it is difficult to design a system that would be comparable to an existing natural organic system. The analysis indicates that in terms of structuralism concepts, it is difficult to identify them in instrumental systems, although they are more identifiable in the local environment system. This is probably because of the influence of time on both systems. The human ecological and social systems have existed throughout very large time spans, and an evolutionary process can be found in them, whereas instrumental systems have only existed with the rise of GST. It is important to understand that structuralism has not contributed to instrumental systems, but has instead contributed to an understanding of natural systems. That is why instrumental systems cannot be observed in structuralism (**Fig: 3.8**).

Analysis shows that GST concepts are more identifiable in the local environment system than in instrumental ones. Concepts that are identified in instrumental systems are there only as a result of the intentions of the designer. Here the decision making process is faster, decentralised, and local in social systems. The physical environment is part of the overall entity. Instrumental systems are detached from their physical environment, where decision making becomes centralised, and slow. In one goals are a result of local needs, while in the second they are state goals and objectives. The existence of instrumental systems to manage the local environment system or settlement depends on the state's perception of a need to do so. The existence of a social system that has a will to manage its own environment depends on the individuals. It is possible for a group of individuals to form a system if they have cohesive and co-operative qualities. Homogeneity between those individuals and the level to which they can represent a '*community*' enhance this system.

	Instrumental Systems As Used In Relation To The Built Environment	Local Environment System
System Hierarchy	-----	●
Communication & Control	❍	●
Holism	-----	●
Open / Closed Sys. Loop	- Open / Closed System - Closed Loop	- Open System - Closed / Open Loop
Adaptation	-----	●
System Goals	Cost- cost effectiveness- execution time- finance	Quality of life for current & future generations
Hard / Soft System	Hard	Soft
Entropy	Tends towards +ve entropy	Tends towards –ve entropy
Feedback / Feedforward	-----..... ● -----	❍ ❍
Homeostasis	-----	●
Sub-Optimisation	Tendency towards sub-optimisation	Sub-optimisation cannot be identified
Equifinality	-----..... ❍	●
Structuralism: Structure	-----	●
Structuralism: Selfregulation	-----	●
Structuralism: Transformation	-----	●
Length & speed of decision making	Lengthy decision making process Centralised	Short fast decision making process Decentralised
Identity of Goals	Central authority goals and objectives	Community needs and objectives
Resources & Knowledge	Physical & knowledge resources abundant	Local knowledge & resources
Management	Beourcratic centralised management	Local self management and self-reliance
Systems Qualities	- Precisely defined rigid system - Systems concepts not fully identified	- Undefined flexible system - Systems concepts may be fully identified
Relation to Environment	- Detached from physical environment	- Part of the physical man-made & natural environment
Resultant Built Form	- Outcome of national objectives - National & international style & identity	- Outcome of local needs - Local style and identity

Fig: 3. 8 Analysis of both instrumental and organic systems in relation to built form.

Conveyance of system concept: High..... ● Medium.... ❍ Low.... -----

3.12 Adaptation and Cultural Adaptation in Structuralist Systems Perspective

The process of adaptation is identified by Haviland as:

> *the process of interaction between changes made by an organism on its environment and changes induced by the environment in the organism.* (Haviland, W A.1990: 151).

Adaptation is the most recognised process of the social system, as found in anthropology and cultural ecology. Adaptation is both biological and cultural, the later being the more significant to the built environment. Yet this concept is used in a particularly wide sense. To take the concept with the structuralist hindsight of surface / deep structure or synchronic / diachronic transformation, will identify its different forms. Adaptation is therefore achieved through transformation. Anthropology refers to what is termed *evolutionary adaptation* from *adaptation*, making the parallel with structuralist divisions. The use of boats by fishing communities shows an *adaptive* capability. The development in the form and shape of the boat over many years to improve efficiency, is an *evolutionary adaptive* capability that conforms to diachronic transformation ordered through deep structure inherent in the community. Such understanding can be used in relation to the built environment as a physical artefact created by the community social system.

On this basis, we can recognise the role of culture as the vehicle of adaptation when *"culture is mans way of adapting to the environment"* (Bennett 1993: 29). Culture as behaviour can be associated with the structural laws linking man and his environment. The transformation process with regard to a community system will take place in the medium of culture (cultural adaptation) (**Fig: 3.4**).

Adaptation must not only be viewed as a necessity for survival but as vehicle for improvement of quality of life. This view is put forward by Masaud (1997), where adaptation is found to be a creative process motivated by human needs, which include survival needs such as food and shelter or social needs including identity or esteem. Adaptation is a process of creative improvement enabled through acquired knowledge and experience.

3.13 Adaptation of Built Form

Adaptation of built form is covered by Massaud (1997). His thesis locates adaptations in architecture and relates them to different human needs as identified by Maslow. These are physiological qualities, safety, belonging and love, esteem, self-actualisation, and cognitive & aesthetic needs. Physical adaptation in built form is observed in the suitability of form to climate. This can be seen in the use of the igloo in the arctic region or use of the courtyard and *mashrabya* in the Arab house. The cultural and social concept of privacy is a clear difference between allocation of spaces in Western and Middle-Eastern house forms. Aesthetic needs and identity are motives for ornamentation. The adaptations found in built form are many and complex. They are not yet fully discovered since they have so much to do with the human mind, an area little understood even today.

These adaptive capabilities as displayed by Masaud are almost all extracted from the indigenous organic environments. This is rightfully so since the adaptive capability of the contemporary environment is weak, because of a lack of freedom to shape the built environment, in the face of centralised regulation and a dominating role by the state. Some examples of the modern built environment are state pre-designed and regulated forms in which the community role is only to inhabit. It must then seek to adapt behaviour to a physical form it cannot shape.

3.14 Local Control and Autonomy as a System

This research is an attempt to clarify the difference between the instrumental systems approach to communities and their urban environment with an organic local environment system, and to observe which is more capable of managing and maintaining the built environment. When discussing control and decision making within the local environment system, understanding should be focussed on internal social or community subsystem, because it is the individuals and not physical matter who make decisions. So in referring to an autonomous system, this is based on the collective of local individual ability to control the system from within. This system may be called *the local community system* or *social system* depending on its application. The use of the term local community system is appropriate in this research because it relates to the definition of the local environment system which was established in Chapter 1.

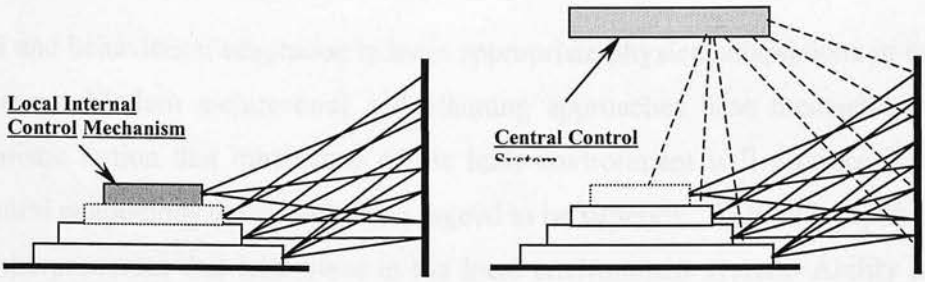

Fig: 3. 9 Centralization of Control.

Loss of local control is due to the centralisation of decision-making and control (**Fig: 3.9**). While in traditional organic settlements decision making is internal, in the contemporary settlement it is centralised. If the community or social system is to be characterised as an autonomous system and internally controlled, then it must contain a hierarchical structure whereby each element is controlled by its effective users (**Fig: 3.10**). This can be translated to an individual controlling his room, a family its home, neighbours their streets and a community its infrastructure. The existence of shared components within the built environment entails a need for a co-operative form of decision making where some levels of centralisation become unavoidable. In this way the hypothetical community system will have an inherent quality of control. This hierarchical structure of control may not necessarily be achieved or found, but many vernacular and organic social systems in Egypt varyingly exhibit this quality (as found in the case study).

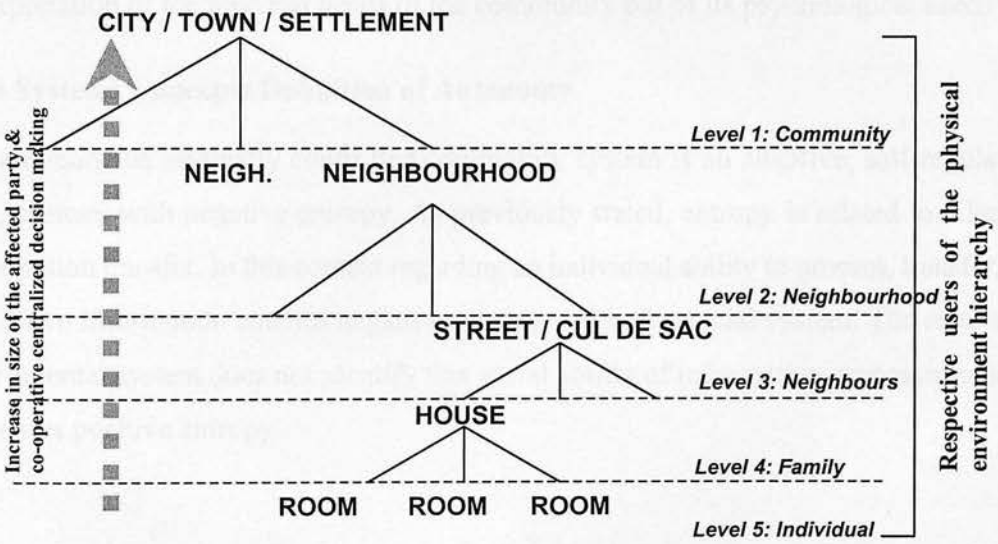

Fig: 3. 10 Hierarchical structure of control and autonomy.

3.15 Adaptation, Local Control and Autonomy

Cultural and behavioural adaptation induces appropriate physical adaptations in the built environment. Modern architectural and planning approaches base themselves on the deterministic notion that inhabitants of the built environment will produce their own behavioural adaptations to the built form argued to be superior[1]. Cultural adaptations are part of the processes that take place in the local environment system. Ability to form cultural adaptations must be accompanied by an ability to form physical adaptation in built form in order for transformation and evolution to take place according to community needs. In so doing, establishing community control and autonomy is essential. Bennett identifies that in order to have cultural adaptation, there must be a degree of *"adaptive autonomy"* (Bennett 1993: 28). It is obvious that without autonomy it would not be possible for adaptation to occur. In order to reinstate a community cultural system that would translate the needs of the community, there must be a structure of autonomy.

The importance of adaptation leads acknowledges a need for a system or methodology that would allow individuals and communities to make alterations within their built form to in order accommodate needs and changes in the environment. Such changes may be an increase in size of the family, introduction of new infrastructural technologies, changing economic activity and changing building methods. *If society at its various levels is the ultimate adaptive and transformational system, then this system should be responsible for shaping the built environment.* The built environment then becomes not only an interpretation of the physical needs of the community but of its psychological needs too.

3.16 Systems Concepts Definition of Autonomy

An autonomous internally controlled community system is an adaptive, self-regulating, soft, system, with negative entropy. As previously stated, entropy is related to a lack of information transfer. In this context regarding an individual ability to process, transfer, and transform information enables negative entropy within the social system. The state as an instrumental system does not identify this social ability of information processing, hence increases positive entropy.

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[1] This is architectural determinism and is discussed in Chapter 1.

The concept of hard/soft system can be of particular significance to the concept of autonomy of a system. By name, a hard system is an artificial system. The definition of the system is left to its designer. This leads to the conclusion that hard instrumental systems in planning aim to control the community system they deal with (particularly when it exerts regulatory authority). A soft system is less centralised, less rigidly defined and natural. It is a self-defining system and has the ability to transform itself.

> *The systems movement adds the concept of the self-regulated machine which has autonomous control over its own behaviour.*
> (Checkland, P.B. 1981: 39)

This is not to say that the appropriate approach towards development of communities is the inaction of central authority. Rather the state should take advantage of the community's ability to self-manage and shape its destiny according to its specific needs, and allow these processes to take place while providing resources that cannot be found locally.

The autonomous system will include a level of central co-operative control, but this must be towards elements of common use. It must wherever and whenever possible enable lower levels of control to function in their proper role within the hierarchy. An example may be the promotion of solar energy and local energy sufficiency to allow the local system to provide for itself. In other words central authority (and bureaucracy) should be made as small as possible. This is the subject of much discussion within the political arena.

3.17 Control and Autonomy as a Process

Autonomy can be seen as an ongoing process constantly evolving in the built environment, not an initial decision that ceases to transform. This contrasts with current understanding of the built environment as a product, designed then sold and used. Turner refers to housing when he states, *"Housing must therefore be as a verb rather than as a noun"* (Turner, 1976: 62).

The need for cultural transformation in the built environment can reflect the changing needs of growing families. The natural process of change in the traditional environment is emphasised:

> *Although in contemporary society, many buildings have been designed and constructed as the finished products, they are continually evolving in response to change of the users` activities. Because most people do not passively accept physical environments, they modify them to fit their own lifestyle and activities.*
> (Chen, K 1992: 11)

Local control should therefore be prescribed not only in the creation of built form but as an ongoing process, i.e. autonomy to change and transform the built environment.

3.18 Definitions of Control and Autonomy

The concept of autonomy in relation to the built environment has not been discussed as such by many. It is therefore important to mention those who have related to control and autonomy in the built environment. Turner and Habraken have attempted to give definitions for the term within the context of the built environment. Turner relates the term more in the planning perspective, while Habraken relates it to a theoretical architectural dimension. The term as used in many areas will ultimately relate to built form. Control in a political and economic sense will have their reflections on the built environment

Habraken states that *" autonomy of the site is compelling when the site is seen as a hierarchy of territories."* (Habraken 1983:46). He has in a similar way introduced autonomy in a hierarchical sense to that introduced in **Fig: 3.10**. The link made to respective users implied is important in the context of his literature. This link will allow for the ability to differentiate between the autonomous and heteronomous in the built environment. Habraken further adds to the understanding of the relationships between adjacent and non adjacent parties by defining them as *"the free choice of limitations and rules among those who understand each other."* (Habraken 1983: 46). We can identify in this statement, a system understanding inherent in autonomy. Hierarchy and a structure of norms are evident in the two previous quotations. Systemness, control and autonomy in built form are apparent in much of his literature in particular *`Transformations of The Site`* (1983).

The identification of public space and private space is another facet of Habraken's definition of control. These elements define which part the individual controls and which are controlled by the state or central control mechanism. Akbar (1988: 10) observes that as a result of central state control, public space has become larger than private space. Roads and squares have gained in proportion with increases in centralisation. Power, control and autonomy become defining factors in the form of the built environment,

By looking at the site as composite of live configurations, we will see it is a product of powers. Its transformation will reveal to us relations among these powers.
(Habraken 1983: 46).

Turner, on the other hand views autonomy in a planning and housing perspective, and its subsequent processes. He strongly defends the need for an *autonomous housing process* in what is called the first law of housing.

> *When dwellers control the major decisions and are free to make their own contribution to the design, construction or management of their housing, both the process and the environment produced stimulate individual and social well-being. When people have no control over, nor responsibility for key decisions in the housing process, on the other hand, dwelling environments may instead become a burden on the economy.*
> (Turner, J.F.C. 1976: 6).

He identifies the processes in the built environment into organising, financing, land/ tenure, planning, tools and materials, building, and maintaining (Turner, J.F.C. 1989). He relates the structure of government in relation to the building process and takes into account the various community organisations and individuals, thus gaining a more practical approach to the concept of creating autonomy than the highly theoretical level reached by Habraken. This is not to say that Habraken is not useful; on the contrary, his theoretical depth can form a basis of successful practice.

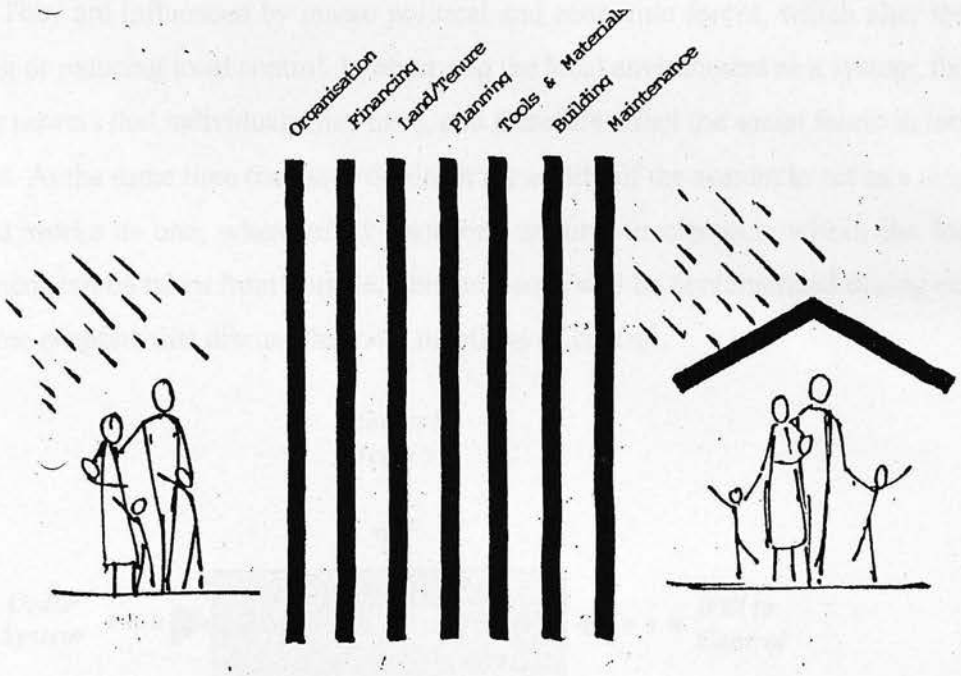


Fig: 3. 11 Tasks involved in providing shelter (Turner, J.F.C. 1989)

3.19 Functions of Control in the Local Environment System

A community's ability to become self-reliant and control its environment depends on many factors. One of these is a communal will to control its surroundings, a quality that might

not always exist. In addition to the will to control the research observes the existence of three functions of local control that either work to enhance the internal processes and mechanisms of control or to dilute them. These three functions are *local order system economic activity*, and *knowledge and technology* (**Fig: 3.12**). These in addition to the existence of a will by the local inhabitants to control and manage their surroundings will enhance local control. Each of these functions is part of the local environment system. To identify control, we must identify *who controls what. Who* relates to the identity of the party that controls, *Control* relates to the powers of control, and *what* relates to the artefact that is to be controlled. These are the three basic parameters that comprise control and are how the affects of the functions of control will be measured in the following chapters through a model introduced in chapter 4 and another in chapter 6.

Each function influences the local environment by having the ability to define different parties and powers in relation to built form, thus defining form. However, two of these functions are influenced by external forces. These two are *order system* and *economic activity*. They are influenced by macro political and economic forces, which alter them enhancing or reducing local control. In observing the local environment as a system, these affect the powers that individuals may have, and therefore affect the social fabric in terms of control. At the same time they may diminish the ability of the system to act as a single body that works as one, where many decisions relating to elements within the local environment can be taken from outside. This influence will be demonstrated during each of the three chapters that discuss the local functions of control.

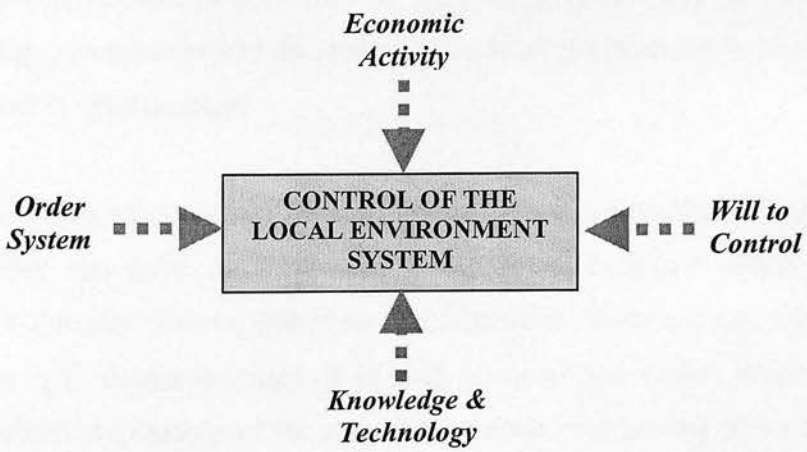


Fig: 3. 12 Functions of community control of the local environment system.

The three functions of control suggested are:

a) *Order system*: Control through law and policy

The homogeneity of the built form of today is largely the result of legal control through regulation of the built environment and policy making. Most regulation is the outcome of the planning process. The *local order system,* whether internal or external, allocates powers of control and decision making in a number of ways. It allocates powers to owners and users, and it also defines the parties that control different elements. In this way it affects the structure of control within the system.

b) *Economic activity*: economic control through changes in local economic activity.

The loss of economic control in a community will lead to the loss of control over the built environment indirectly and directly. Directly this will affect built form by making changes to the location and form of the architecture holding the economic activity. Indirectly, macroeconomics can be a catalyst for the growth of the built environment, or conversely its decline.

c) *Knowledge & Technology*:

In the past, loss of local building knowledge has caused loss of ability to transform local built form by the individuals and the co-operative community according to their needs. Whether or not the knowledge can be found within the local community is an important factor. In terms of technology, its form determines whether or not it is manageable and controllable locally. The form of infrastructure technology, an integral component of the built environment, and its scale often means it has to be centrally provided and managed. Technology can contribute to the control of the local environment from within through its application in infrastructure.

These functions transform the local environment by determining the parties and control powers that they have, the most basic components of control. When observing these functions, we must observe how these functions affect these two basic determinants. The functions will determine what it is that is controlled (what element of the built environment), the identity of the party that controls, and powers of control. This is how these functions will be observed in the following chapters. The following identifies some parties and powers of control.

3.20 Measurement of Control and Autonomy

Control and autonomy in a social system are related to self- management, self-reliance, and local community organisations. The objective is then to create a method for evaluating and measuring control. Evaluation techniques that are to be used in this and the forthcoming chapters can be seen in the determination of parties and powers and are represented in the following section.

a) Owner / User / Controller: Law attributes powers of control to users, owners and controllers. This was put forward by Akbar (1988: 19) and will be closely investigated in relation to the built environment in Chapter 4 and Chapter 5;

b) User / Designer / Builder: This relationship was put forward by Habraken (1985). He describes *"the user (who controls the use of the artefact), the designer (who controls the form), and the maker (who controls the transformation of the matter)."* (Habraken quoted in Lawrence 1993: 4). This will be investigated in Chapter 6;

c) Community / Planner / State: This relationship is a wider one on the community level. It differentiates incremental growth with a planning process. It has also been put forward by Habraken (1985). This method will be observed in Chapter 4 and was discussed in Chapter 1;

d) Turner also establishes methods to evaluate autonomy within the built environment. He locates three forms of decision-making, Planning or operations that precede building, construction or building operations; and the management and maintenance of what is built. Consequently he locates three parties or actors that may be persons, groups, enterprises or institutions; these are users, suppliers, and regulators. These can be transformed consequently to popular sector, private commercial sector, and public sector or government.

Turner also identifies different roles for central government, municipal or local government, private and community. Central government should supply and guarantee access to basic resources which could be materials, knowledge and methods, or tools (elements). Municipal government supplies the infrastructure or more decentralised

resources (components). Community and private parties should have the role of building and maintaining the built environment.

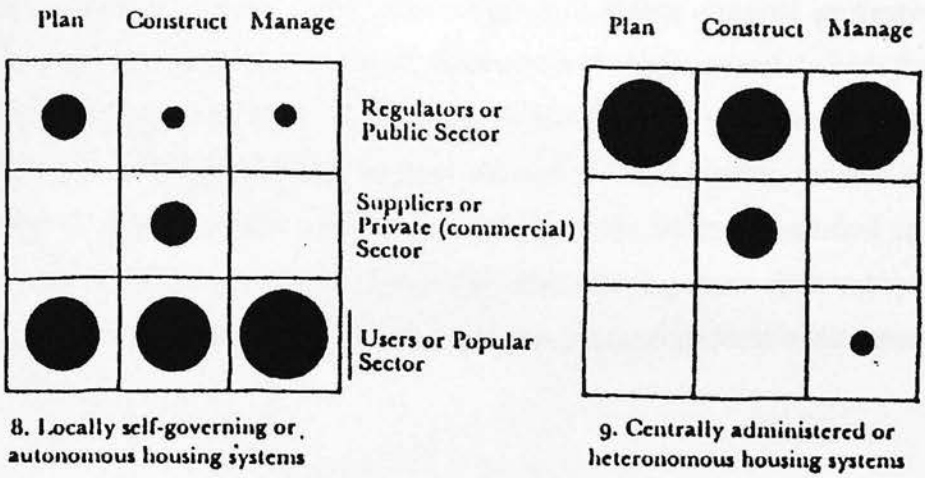


Fig: 3. 13 Turner's methods of evaluating autonomy (1976).

3.21 Systems and Sustainability

The notion of systems is essentially related to that of sustainability. This is because of the environmental origins of sustainability, which acknowledge the *systemness* of the natural environment. This has extended to the recognition of the role of man in the environment system. In this way to identify the *systemic* processes that take place between man and his environment would enhance our understanding of sustainability. The term sustainability should also be related to transformational processes introduced in structuralism. In sustaining the quality of the human environment, transformations of cultural and physical adaptations are essential. The role of local control in allowing these transformations to occur will enhance the sustainability capabilities of the local environment. Although the origins of sustainability stress system understanding, current applications do not always confirm this understanding. A return to understanding the environment as a system where man is an integral part will readdress sustainability and redefine its applications.

3.22 Recapitulation and Conclusion

This chapter was employed to record an understanding of the *local environment system* as noted in the natural processes that take place between man and his physical environment; and the *instrumental designed system* seen in terms of architectural and planning applications, where both define built form differently. The application of systems concepts

to both was to gain a deeper understanding of them and to be able to better assess their processes and understand the transformation of control within them. The outcome as found in **Fig: 3.8** indicates the local environment system as defined has the ability to embrace a larger number of system concepts through its inherent internal processes than the instrumental system which has not yet developed to the same extent. In both these systems the transformation of control differs where different parties will have varying powers of control over built form as will be demonstrated in the following sections of the study relating to the three *functions of control.* Systems theory, identified in GST and Structuralism, was used as tool to derive an understanding about different systems while defining built form and the way control and power may transform within them.

CHAPTER FOUR
Order System

Order System

4.1 Introduction

The built environment is subject to an array of regulation that is applied to it, organising its processes of formation and for it to satisfy different aspects of human wellbeing. Regulation is undertaken through the state planning systems in different processes, such as instating building regulations and permits, identifying procedural frameworks, defining the rights of individuals in relation to the state and executing of general planning policies of transport or environmental management. It is in essence a central decision making mechanism. However the state is not the only system that attempts to regulate building processes. In traditional settlements, this process can take place through local norms and conventions agreed upon by individuals and people of authority. This local essentially social system, although it has become rare, can fulfil many of functions currently taken over by the state[1].

This chapter will provide examples of state regulation of the building processes found in Egyptian law. It will also provide an example of local norms and conventions as found in the traditional Muslim / Arab urban environment. These were chosen to exemplify the state and local norms and conventions because of their association with the case studies and because of the researcher's background. Both these systems of regulating the built environment are referred to here as the *local order system,* which is seen as the first function of local control. This function is subject to political powers, because of the ability of the state to transform political agenda into the built environment through planning policy.

The *local order system* function will be assessed by identifying the effects on local parties and the powers of control in relation to different elements in the built environment. These are often defined through the state system as it identifies the rights of individuals and that of the state itself as a controlling party. The chapter commences by introducing a model that defines parties and powers, and then observes a *local order system* whether through Egyptian State regulation or traditional Arab norms and conventions.

[1] This is demonstrated in the case study of the thesis see below.

4.1.1 Significance of *Order System* to the Built Environment

The significance of laws or conventions as a tool of the order system in understanding the formation of the built environment can be made for two reasons. The first concerns the powers of control that are given to individuals and parties. These powers are the claims of ownership, use and control. They give individuals and parties capabilities to initiate, manipulate and maintain the built environment. The identity of the parties given responsibility and power and the way they are permitted to use them determines the form and quality of the built form. The second concerns the identity of who initiates regulations or norms (and if the local community has that ability to initiate codes according to unique local social and environmental factors), in so doing achieving and maintaining local interest. Norms and laws will manifest themselves in the built environment whether as a result of trying to regulate the built environment itself or in defining the rights of individuals that occupy it.

4.1.2 Planning and Legislation

The planning practice, the major tool for instigating law and regulation governing the built environment, is a centrally administered system with little authority allocated to localities. The planning process originated at a time of urban growth and risks to public health resulting from unsanitary conditions found in some settlements. Although initial motivation is commendable and of public interest, planning objectives have multiplied in effect creating a complicated system which often restricts community, individual authority and responsibility thereby negatively affecting the built environment. This has been commented upon from the beginnings of planning regulation:

> *We have ....laid a good foundation and have secured many of the necessary elements for a healthy condition of life; and yet the remarkable fact remains that there are growing up around our big towns vast districts, under these very by laws, ...compared with which many of the old unhealthy slums are from the point of view of picturesqueness and beauty, infinitely more attractive.*
> (Unwin 1909:3)

Cullingworth, the author of numerous planning textbooks makes this comment himself:

> *The physical impact of by-law control on British towns is depressingly still very much in evidence.*
> (Cullingworth, J, B. 1994: 1)

These are strong confessions, particularly from Cullingworth, a mentor of planning practice. The planning process, in itself a major function of the form of the built

environment, is strongly intertwined with the political system. Judicial, legislative, and executive authorities all have significant roles in the regulation of the built environment (**Fig: 4.1**). This centralised system has occupied many functions found in traditional settlements with strong internal social systems.

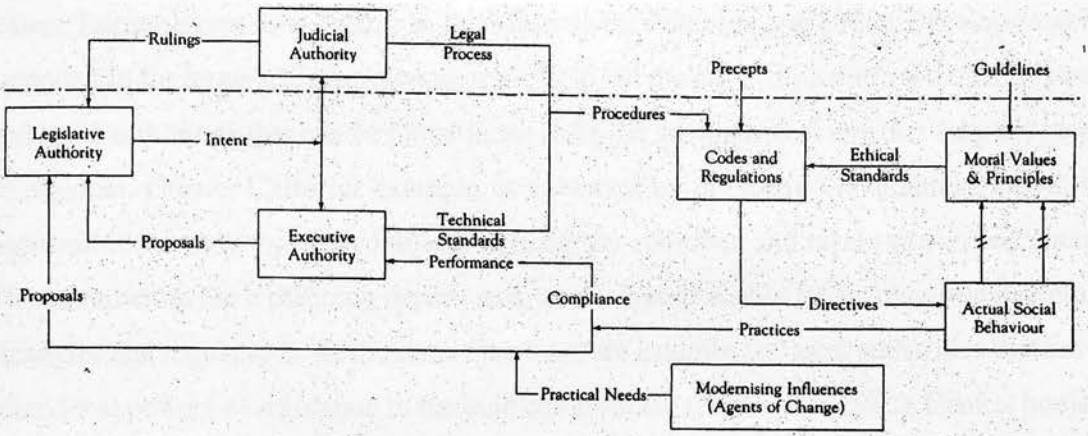


Fig: 4. 1 The state system and the regulatory processes of the built environment (Serageldin, M 1985: 262).

4.1.3 Norms and Conventions

Before excessive centralisation and increased roles of the state, regulation of built form existed through local norms and conventions some of which became local unwritten law. The ability to form such a system of conventions relied mostly on the cohesiveness of community and the existence of a hierarchy of individuals with delegated authority. This is a form of local order is consistent with modern regulation. It has the ability to substitute legislative, judicial and executive authority locally. Here co-operative decision making is identified in relation to common elements of built form. It orders the built environment in a non-inhibiting way, allowing individual adaptations suited to both environmental and individual needs and is less rigid compared to state regulation.

4.1.4 Hierarchical Organisations

Both the state regulatory system and local systems of norms and conventions are subject to hierarchical organisation. In a local system of norms and conventions, there is a hierarchy of delegated individuals having limited responsibilities. These individuals may be local elders, who although not appointed in a formal way, reflect strong local representation by choice of the community[1] and correspond to the social hierarchy. In the social context, heads of extended families represent the members of that family and simultaneously they represent the interests of those who live near to them in the built environment. The most respected individual who lives in a particular street or area will

[1] Authority through elders can be found in the Egyptian context, as observed in the case study.

represent its interests towards neighbouring areas.

This hierarchy varies in the state, from central government to local authority. The state system itself has a hierarchy of bodies with varying authority according to their official status. Taking Egypt as an example, the Ministry for Planning and Urban Development is responsible for large-scale development projects. At the same time there are tiers of state and local authorities that can be found in the different governerates[1] whether they are local or regional. Greater Cairo for example, is governed by the Cairo Governerate, which is responsible not only for metropolitan Cairo, but for suburban and rural surrounding areas. The governerate has a planning department, which is responsible for many of the planning strategies and regulations. At the same time there are a number of local authorities that have more local powers of regulation in the built environment (Nabih, E S 1982). Central bodies will have overriding powers in relation to local bodies that have the responsibility to manage local settlements and implement central regulation. Within the hierarchy of bodies that control the built environment in Egypt, those that are central have more powers and authority than the local ones. In conclusion, decision making is extremely centralised.

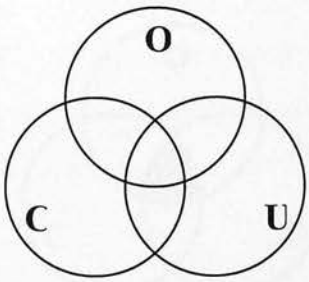
4.2 Forms of Submission

The study introduces at this point the concept of the *forms of submission*, which are an important tool towards comprehending of the built environment with respect to control and responsibility. Notions of control, autonomy, change and the time dimension, introduced by N.J. Habraken (1982), are the origins from which Jameel Akbar (1988), a pupil of Habraken formed a model to locate responsibility and control in built form. This model of *claims* and *parties* facilitates linking responsibility to architectural form and quality. It can also demonstrate that changes in responsibility affect built form, enabling an assessment of change that occurs with time. There are three parties: *user*, *owner* and *controller*. Each party is allocated controlling powers according to its claim, as defined by state law and the planning system.

4.2.1 The Model

The model is a relationship of claims and parties using a Venn Diagram. There are three overlapping circles, each representing a claim. Parties are represented through shading of particular areas within the diagram. The number of shaded areas represents the number of

parties sharing responsibilities and controlling powers in relation to a particular element of built form being observed (**Fig: 4.2**). The model determines the relationships found between claims and parties. It can be applied to different elements of built form. It can be applied to a house, to individual rooms inside the house, even to objects of furniture. On an urban level it can be applied to roads, street furniture, infrastructure, or parks.



O Ownership
U Use
C Control

Fig: 4. 2 Model of *Forms of Submission* (Akbar, J 1988: 18)

4.2.1.A Claims

The first component of the model is that of *claims*. It identifies type of authority and control practically. Claims of **ownership, use** and **control** can be observed in any object. They each represent a power of control. Ownership and use are relatively straightforward. A house may be owned and used by different individuals. Each individual whether owner or user has certain rights that differ according to law or convention, or predetermined agreement or contract. It is customary, for instance, that a tenant of a property is only allowed to manipulate the internal organisation of furniture. Sometimes, in the case of a long lease, the tenant may be allowed to alter partitions. The claim of control is not so obvious. This claim of control is defined as the right to manipulate elements without necessarily owning or using them. The claim of control is usually held by the state. A hotel manager may be seen to hold the claim of control when observing the execution of interior design within a hotel. If it is a large hotel, owners could be stockholders of the Hotel Company and the user party might comprise tourists and guests.

4.2.1.B Parties

The second component of the model is that of *parties*. It identifies the individual or group of individuals that hold the claims. Identification of a party and its' size is useful to understand how a built form is shaped. A party will act according to its values, norms and conventions. The size of the party relates to how the decision is made, whether it is a co-operative or central decision-making process. Co-operative party making can be seen in the case of the combined responsibility from the residents of an apartment building over shared, elements such as the staircase and the roof. If the roof is leaking, costs of renovations should be shared by all and not just by the top apartment.

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[1] These correspond to UK regional and local councils.

4.2.2 Claims / Parties Relationship

By investigating possible relationships between the claims of control and the number of parties sharing responsibility over an artefact, we can observe how they affect built form. These relationships are called forms of submission.

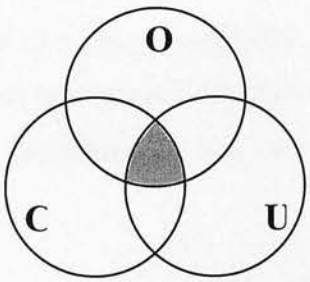


Fig: 4. 3 Unified Form

4.2.2.A Unified Form of Submission

The first relationship between parties and powers is the unified form of submission. In this form there is only one party that holds the three claims of ownership, use and control. The existence of one party means stronger controlling power over the artefact or built form. This party therefore has the ability to shape according to its individual needs and a better ability to manage and maintain.

4.2.2.B Dispersed Form of Submission

This form of submission occurs when there are three parties, one for each of the claims. One party owns, a second controls and the third uses. Good communication between the parties is essential to maintain the property and each party's interest. The sharing of claims and responsibility by a number of parties means a difficulty in shaping and maintaining the property according to particular needs. This in turn affects the property negatively because of possible conflict between interests.

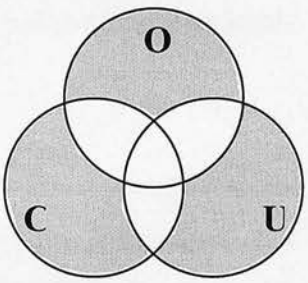


Fig: 4. 4 Dispersed Form

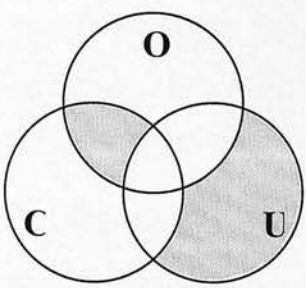


Fig: 4. 7 Permissive Form

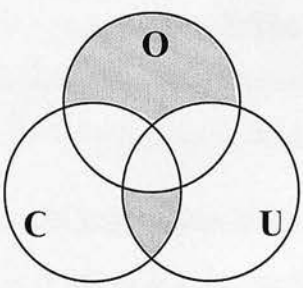


Fig: 4. 6 Possessive Form

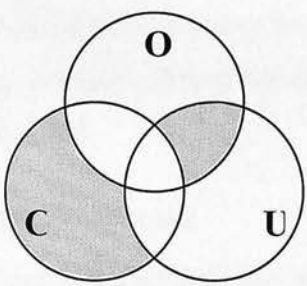


Fig: 4. 5 Co-operative Form

4.2.2.C Permissive, Possessive, and Co-operative Forms of Submission

These three relationships share with each other the existence of two independent parties holding claims over the property. The permissive form (**Fig: 4.7**) is characterised by a party that uses a property, and one that owns and controls it. In possessive form (**Fig: 4.6**), a

party that controls and uses a property has to deal with a party that owns it. The co-operative form (**Fig: 4.5**) (trusteeship as identified by Akbar-1988: 19), a party owns and uses a property while a second controls it. These three forms give less control over the architecture to the user than the unified form, but more than the dispersed form of submission.

4.2.3 Size and Remoteness of Parties

Parties holding different claims on a property can vary significantly in size such as when large organisations own property as compared to individual ownership of property. An increase in the size of the party might also happen when a property is inherited. The state is a very large party and has powers of authority over all built form. The increase in size of a party negatively affects the artefact it is controlling. This is because there is an increased possibility of conflict between individuals of a single party and because decision-making processes become longer and more complicated.

Remoteness is a second quality that may be associated with a party. This relates to whether or not the party is in direct contact with the artefact it is controlling and is seen as a negative quality. A party will exhibit remoteness when it is either physically distant, or when it sees no interest in the property. The second will occur if a property shows no immediate financial gain. To an extent, remoteness is related to size. Often with the case of large party size, as in corporations or even the state, this party is at least not physically present. Company headquarters are often impressive well-maintained pieces of architecture that can be seen to contradict the model. However this is because there is a strong financial benefit in maintaining the built form when large resources are available. Proper assessment should take into account the cost of maintaining the property well.

4.3 Observation of the Forms of Submission in the Built Environment

The unified form of submission is the most common form found in traditional[1] and organic settlement forms. Properties such as homes, work places, and some services are mostly found in this form, which gives more control and responsibility to the property owner while user, and enhances the ability to shape built form to individual needs. This promotes a built environment that is better suited to its users and is more efficiently maintained.

[1] Traditional settlement forms relate to old urban environments where the state had less regulation.

Modern settlements are characterised by an abundance of the dispersed form of submission because of extensive state controls and abundance of property letting. The existence of a controlling party is determined by the extent of state control through regulation. Weak regulation allows the owner to take over the claim of control, because of the extra freedom allowed.

The permissive form of submission is found in the case of the leasing of a property and at the same time where there is diminished state control. Again, the owner becomes the controlling party. This form changes to dispersed form as central regulation increases. Typically this is found in the case of a rented house or rented passageways found in the traditional Muslim settlements (Akbar, J 1988: 20).

The possessive form of submission is not common. It is unusual that a user party may hold the claim of control replacing the owner and the state. Market places owned by the state, yet having large powers of control in the hands of merchants are an example. The amount of regulation initiated by the state determines whether it is a possessive or permissive form. A claim of control is observed in the extent to which the merchant is able to shape his stall. A similar case is found today in Egypt in agricultural land, whether owned by the state or landlords (Farid, M 1994).

The co-operative (trusteeship) form of submission is more rare than the possessive form. It can be found in co-operative companies or family owned and run small businesses (see chapter 5). It can also be found in the case of trusteeship of properties, such as a trustee in charge of an orphanage. In these cases the party that uses the architecture owns it. The party of control is the state in the case of co-operative companies and a trustee committee in the case of an orphan trust.

4.4 The Claim of Control and the State

Before the increase of state regulation, its claim of control was non-existent. With centralisation and the expanding roles of governments, a new party appeared in the built environment. The state as a party is both large in size and exhibits remoteness. The introduction of this new party had fundamental affects on the built environment. It increased the number of parties that controlled the property, causing a once dominant unified form of submission to become co-operative, and a permissive form of submission

to become dispersed. At the same time this new party defined powers of control each party had including its own.

4.5 Assessment of Patterns of Control and Responsibility

The previous model determines parties and powers, the prime components of control. It can therefore be useful in assessing control in the local environment. It shows how changes in control pattern which affect the built environment can be assessed as can be seen in the case studies. This assessment will record the effects of these patterns on the quality of the built form towards the users and towards sustainability indicators, where users cumulatively comprise the local community. It also helps assess the extent to which users are able to shape their own environments towards their own needs. Each form of submission will contribute to local control to a greater or lesser degee. **Fig: 4.8** shows the order of the forms of submission towards satisfying a higher level of local control, as well as depicting the size and remoteness of the parties towards this objective.

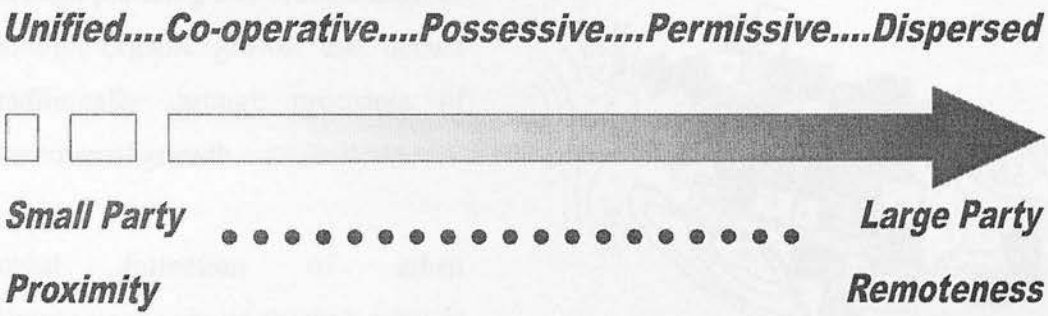


Fig: 4. 8 Increase in control and responsibility of user party, and cumulative community authority. Potential of increased ability to shape according to individual needs.

4.6 Phases of Control over Built Form

While the previous model enables us to identify parties and powers in relation to built form, it fails to critically take into account time and the different processes a built form can go through during its lifetime. In order to do so the research proposes to observe forms of submissions during three phases that a built form passes through, namely *formation*, *management & maintenance* and *adaptation*. During each of these three phases there exist different forms of submission.

4.6.1 Formation

This is the most important phase because in it the most lasting qualities of the built environment are defined. Formation takes place not only in relation to individual architectural forms but also in relation to the structure of the urban environment as a whole, taking into account street networks, central services and facilities. The forms of submission of urban environment as a whole were not discussed in the previous section. Urban form can either be realised through planning and urban design or through organic growth that occurs traditionally through processes of incremental growth.

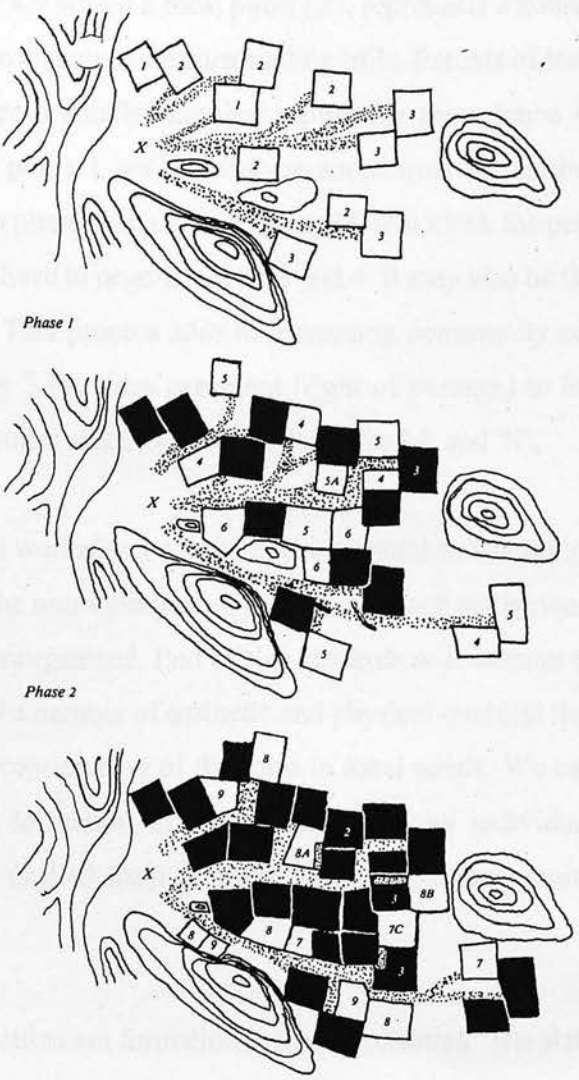


Fig: 4. 9 Phases of incremental growth (Akbar, J 1988:81)

Initial formation of urban environments occurs through what is termed reclamation or revivification (Ibn-ar-Rami 1982). Both terms suggest the claiming of land not previously used. Neither of these processes are centrally planned: "*Town expansion in the Muslim world is generally not planned by central authority.*" (Akbar,J. 1988:71). This was also true in medieval towns in Europe. In the traditional Muslim built environment, revivification was permitted on any land, sometimes on land that has an owner who does not intend to develop it. The practice of demarcation was the method of claiming a piece of land. This practice is still used today in the informal settlements were settlements are organic.

Incremental Growth

The traditional process of settlement formation was incremental growth. This is a very slow and adaptive process, in contrast to modern planning mechanisms. It starts through

revivification and *an accretion of decisions* where each decision made is a future constraint. A hypothetical case is represented in Fig: 4.9 where a focal point (X), represents a source of water, and a number of topographical constraints are surrounding hills. Parcels of land are claimed through revivification where a smaller number represents precedence in claiming the parcel. Existing parcels in phase 1 are themselves constraints for further revivification in phase 2, and henceforth in phase 3. In phase 2, party 5A will block the path of parties 3 and 4, therefore party 5A will have to negotiate with 3 and 4. It may also be the case that parties 5A, 3 and 4 are related. This process adds to increasing community co-operation and cohesion. In phase 3, party 3 provides easement (right of passage) to 8B possibly through financial agreement. Similar situations can be found in 8A and 7C.

This process enables an urban form that is well adapted to its environmental surroundings and the social norms of its community. The non-existence of planning in such settlements creates an urban form that is seemingly unorganised. Part of this research will attempt to prove that this unorganised form produced a number of aesthetic and physical qualities that are neglected today, among which is appropriateness of the form to local needs. We can also recognise that with respect to the formation of the settlement or its individual architectural units, these conform to the unified form of submission where community represent the user and controller parties.

The modern conventional mechanism of settlement formation is master planning. The state controlling the formation of the built environment, introduces itself as a party whether in relation to the growth of a settlement or formation of individual architectural units. The case of settlement formation in Egypt (discussed in the forthcoming case study) is a highly centralised and regulated process. The state creates a master plan and lays out infrastructure and services. Land plots are then sold to the public. The master plan determines diversity of land use, the size of the plots, building heights, etc. This mechanism clearly identifies the state as a controlling party in urban growth processes (Egyptian Urban Planning Law 1996).

4.6.2 Management and Maintenance

The management and maintenance phase is concerned with the up-keep of the built environment. It is common that the state has little to do with the maintaining of individual units of architecture and forms. This effectively means that the form of submission with

regard to the management and maintenance is unaffected by the introduction of a controlling party, namely the state. This is not true of all elements within the built environment. Infrastructure elements of wider community use such roads, water and sewage networks are in contrast with units of architecture in that their management and maintenance are entirely in the hands of the state. While the forms of submission in this phase will not normally include the state, in relation to infrastructure the state still has a very dominant role.

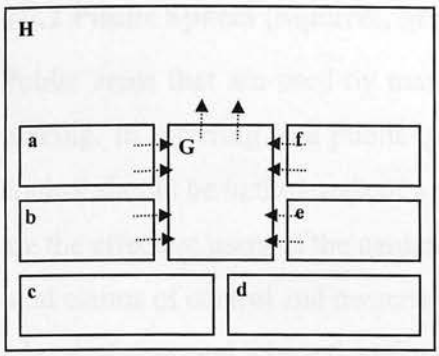
4.6.3 Adaptation

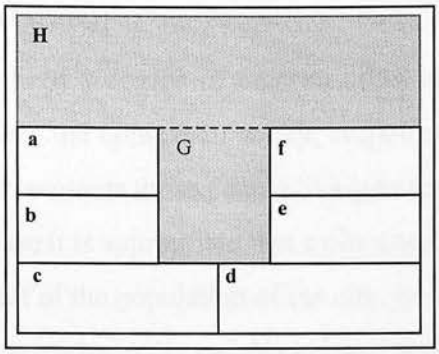
Adaptation is the third phase that built form undergoes during its life span. It is concerned with making alterations to built form reflecting changes in need and a flexibility of form. Such would include increases to the number of floors of a property, addition of rooms or alteration to a facade. Sometimes such alterations are permitted freely by the state, releasing the claim of control to users and owners of the built form. But it is also often the case that the state introduces many regulations regarding the alterations to built form so that the claim of control in this phase is partly transferred to the state. The amount of state controls determines the identity of the party having the claim of control regarding alteration.

4.7 Collective / Co-operative Control over Common Elements

The application of the previous model is more straightforward in relation to an artefact that is used only by a limited number of people. Within the urban environment there exists many examples of elements that are of common use to a wider number of people. Such examples are street networks and thoroughfares, infrastructure and many services. Roads provide a good example of viewing the patterns of control over an element of common use. The norm today is that road networks are centrally owned by the state (i.e. public ownership), represented by local authorities that at the same time hold the claim of control, while users have almost no powers of control through their claim of use. Conversely in the case of traditional settlements, elements of common use or public facilities were structured hierarchically in terms of control. Habraken identifies this by arguing *"the Arabic tradition encourages the piecemeal definition of the public realm by the addition of individual action. These contrasting forms of spatial conventions illustrate the concept of social control."* (Habraken quoted in Lawrence, J.R. 1993:4). Akbar illustrates patterns of control (**Fig: 4.10**) to differentiate the autonomous and heteronomous. In the analysis of traditional and contemporary, control over common elements of the settlement are found to be parallel

to their respective users in the traditional environment.





Autonomous Environment
- a,b,c,d,e,f, control their boundaries and common space G.
- Collective G's control H.

Heteronomous Environment
- a,b,c,d,e,f, only control their own boundaries.
- Collective G's and H are centrally controlled.

Fig: 4. 10 Private and public space in an autonomous and heteronomous env. (Akbar, J. 1988: 62).

As there is an increase in the number of affected people, a more complex form of decision making is needed which may either be centralised or co-operative (**Fig: 4.11**). Decision making may happen through forums, or public debate among individual members of the community. This shift towards public use recognises the need for the state to manage much of the infrastructure facilities. However, it is sometimes possible to manage such facilities through local co-operation, which enables better management because of proximity of the affected parties and for decisions taken better adapted to the local environment. This ability is observed in the case studies. Many elements of the urban environment are of common use to large numbers of people. In effect the user party is large. The patterns of control of these are observed in the following section.

4.7.1 Dead-end Street / Cul-de-sac:

These streets are part of the overall street network but at the same time are identifiable because they have limited number of well-defined users. They cannot be used for access except to their surrounding property. The dead-end street is a feature of more traditional urban settlements such old Arab settlement forms where sometimes street gates were used (Al-Hathloul 1981: 36). It was understood that the street was owned collectively by the owners of adjacent properties. Management of the street environment was their responsibility and therefore street gates were used for security (Akbar, J 1988). Cul-de-sacs are a similar built form element to dead-end streets in that they too have a well-defined number of users. However, claims of control do not follow those of the dead-end street because cul-de-sacs are a feature of modern settlement forms where road networks are

publicly owned and under state control.

4.7.2 Public Spaces (Squares, Market Places, etc):

Public areas that are used by many people need a degree of centralisation in decision making. In referring to a public garden within the context of a city, responsibility and control should be in the hands of a body that represents those people living in the city who are the effective users of the garden. In this case it is appropriate that a city council should hold claims of control and ownership on behalf of the population of the city. In the case of a local playground where the effective users are principally neighbourhood residents, co-operative control would suggest that authority be allocated to members of the neighbourhood. This means there needs to be a body to represent those users at a local level. Market places can follow patterns of control that are central or local, again depending on the relevant users. If it is a local market, then claims of control and ownership should be in the hands of the effective community and the traders. Other common elements of the built environment such as mosques and squares can follow similar patterns of control (**Fig:4.11**).

4.7.3 Road, Water, Electricity and Sewage Networks:

The road infrastructure differs in the ability for it to be locally controlled relative to other forms of infrastructure services. Alternatively, it can be centrally controlled by the state where the overall network is viewed as one artefact that needs to be managed on behalf of the respective users. It is possible however to observe a hierarchical control pattern in street networks (**Fig: 4.10**). This pattern of control allocates responsibility to adjacent property owners. The road network becomes a cumulative responsibility of adjacent properties[1]. This pattern cannot be found in relation to other infrastructure networks. This is because of the sophistication needed in both their construction and management. They also extend throughout a settlement, necessitating the existence of a central body to manage them. In this case it is appropriate for local authorities to control and manage them as a delegated body of the collective users.

4.7.4 Power, Water and Sewage Plants

Power, water and sewage systems are obviously large and sophisticated components of the urban environment having an enormous number of respective users. Their technologies and

[1] This pattern of control is found in Egyptian villages and small towns as shall be seen in the case studies.

sizes inhibit local control, and are appropriately managed by central local authority. Some alternative energy methods and water and sewage treatment technologies do enhance local control over these elements but these are not presently widespread enough (see chapter 6). In conclusion, *the appropriation of power and control over any element of the urban environment whether it be architectural form or not, should correspond to its effective users.*

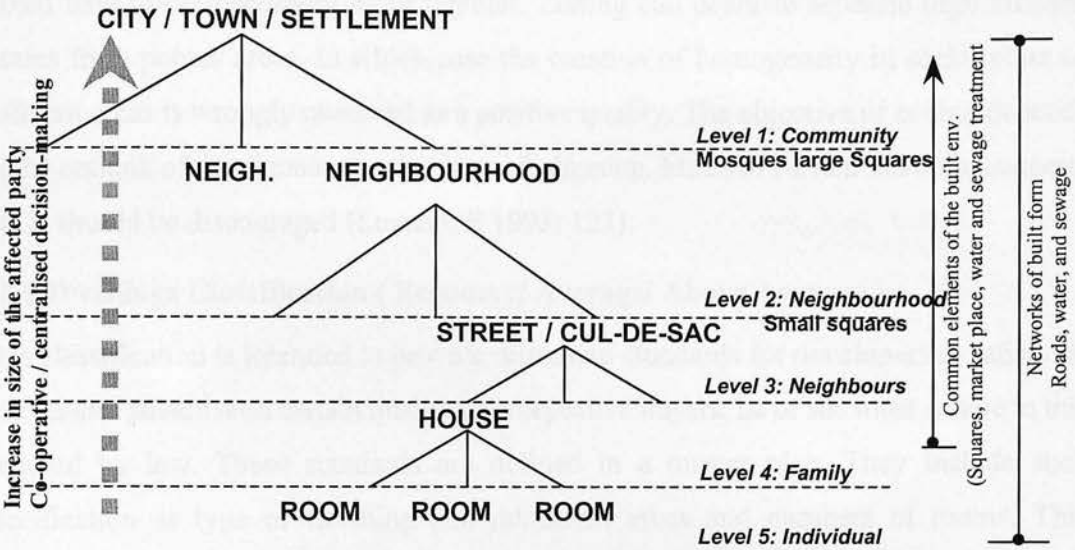


Fig: 4. 11 Co-operative and centralised decision-making in the built environment.

4.8 Modern Regulation and Law in the Built Environment

This section is intended to provide an example of the controls exercised by the state to organise the built environment, namely building regulation. This is an example of the first form of a local order system as applied from outside the local environment. The example taken is that of regulation in Egypt (Urban Planning Law - Building Regulations, 1996), which will provide an idea of the types and effect of controls introduced by the state and the objectives they are intended to achieve. Such objectives are ventilation, lighting, sanitation, prevention of over crowding, structural safety, and safety against fire.

4.8.1 Master Planning

The master plan determines much of the regulation found in a particular settlement. While defining building controls it may also define physical characteristics of a development reflecting on its quality. It attempts to provide healthy living conditions for people according to the views of the decision-maker and planner. There is no user input in the master plan, although sometimes a local population may have a consultation role. The

master plan defines other regulatory tools as demonstrated below. It is not a building regulation in itself but a definer of regulation.

4.8.2 Land Use Zoning

Land use zoning is founded on the assumption that mixed use is not a positive quality of the urban environment. This may be true if residential and industrial areas are adjacent, but not true in the case of mixing of commercial with residential areas. As a result a return to mixed land use is becoming more popular. Zoning can occur to separate high affluent estates from poorer areas, in which case the creation of homogeneity in social class of different areas is wrongly observed as a positive quality. The objective of zoning depends on the outlook of the planner on what is good planning. Much of current literature suggests that it should be discouraged (Lozano, E 1993: 131).

4.8.3 Dwellings Classification (Economy/ Average/ Above Average)

This classification is intended to provide minimum standards for developers to satisfy. If a developer advertises a certain quality to prospective buyers, he or she must adhere to this standard by law. These standards are defined in a master plan. They include such specification as type of finishing and minimum areas and numbers of rooms. This classification was important in Egypt when most people bought the title to property before it was built.

4.8.4 Building Density

This regulation defines ratio of built up areas to free space. This measurement is established to prevent overcrowding and allows for more healthy living conditions by providing more open spaces. It may be applied to a plot of land, thereby restricting making extensions to the built form vertically or horizontally. It is a figure that, when applied, should not be exceeded.

4.8.5 Plot Ratio

The plot ratio is a ratio between the area of land used up by the building on the ground floor and that left open. The objective here is to provide a minimum amount of open space and enhance living conditions. It is a restriction on the ability of the property owner to extend their property. It is often used to increase green areas in plots of land and thereby improve the aesthetic quality.

4.8.6 Setback

This measurement can be applied at any side of a plot of land. It is applied to common boundaries of plots of land often to prevent conflict between adjacent property owners. At the same time it enables more ventilation to occur within the building by freeing more peripheries whereby window openings can be made without compromising privacy. This also allows more daylight to penetrate within the building. When applied to the front of a piece of property they aesthetically improved the approach to the property. Setbacks may also be used to increase sunlight penetration into narrow streets.

4.8.7 Building Heights

This regulation may be used in order to prevent the increase of apartment units within a neighbourhood and stretch the use of the infrastructure beyond its capability. It can also be applied to provide a perceived aesthetic quality of a low-density suburban neighbourhood. It helps to unify the form of buildings.

4.8.8 Codes Of Ventilation and Lighting

Regulation covering the quality of ventilation and lighting is exercised through the determination of window opening areas and dimensions of internal courts. This regulation typically requires that each room must have at least one window of a minimum area depending on the room type. The area differs according to the room, with smaller areas for kitchens and toilets than living rooms and bedrooms. A window can be located on the circumference of a building or on an internal court.

4.8.9 Minimum Room Area and Dimensions

The determination of minimum areas for rooms and their dimensions is intended to ensure healthy living standards and prevent cramming and overcrowding. This is also to ensure that developers provide good quality living quarters and do not attempt to *cut corners* to achieve financial profit.

4.8.10 Staircase

The significance of staircases in regulation is concerned with providing access and escape in addition to outlets for fumes in the case of fires. Like rooms they are regulated to ensure minimum size to allow for ease of circulation in exiting the building, while at the same time accommodating the minimum size of a stairwell window as an outlet for fumes.

4.8.11 Building Protrusions

These define the minimum length of a cantilever above ground level. Although these cantilevers are generally allowed and provide shade in street areas, excessive protrusion can be harmful particularly in the case of narrow streets where buildings can become too close to each other.

4.8.12 Owner and user rights

These determine the rights of owners and users. In Egypt the user or lessee has many rights that allow him to do almost anything inside built form apart for making changes to the structure. The owner in Egypt has for a long time not had strong rights and therefore was discouraged to let out any of his or her property he might have available. The objective of the state in giving large controlling powers to the user was because it viewed the user as a needy individual who could be abused by owners. In this way the state was attempting to stop widespread dissatisfaction among these people unable to own property due to poverty (Nabih, M E S 1999).

4.8.13 Summation

In summation this regulation was advocated for a number of objectives, many of which depended on aesthetic quality as perceived by the planner and the decision-maker. This was applied through land use zoning, building densities and plot ratios. More direct physical objectives included achieving good ergonomic conditions through determination of minimum floor areas and internal furnishings. Safety in the case of fires, and the provision of good daylighting and ventilation determine minimum window openings, and staircase and internal court dimensions. Law determines the rights of the owner and user parties, in addition to those of the state as a controller party which often uses its powers to political ends. Often these regulations are instated to satisfy planning policies concerning transport or the environment. Most of the time, regulations are applied depending on the objectives of the decision-maker.

In an attempt to cover every scenario and anticipate worst cases, regulation has often become too precise, specific and detailed, making regulations inflexible (Peck, M K 1996). Regulation and its universal application cause standardisation and uniformity in the built environment (Baer, W C 1997). Uniformity and homogeneity in the built forms lead the urban environment to become monotonous (Lozano, E 1993: 131). The regulation tools and

their application are taken mostly from Western precedent that does not always suit the local environment. The use of setbacks, for example, increased the spaces between built forms to becoming larger than traditional urban environments. This leads to overheating of buildings in arid zones, because of a lack of shade. Regulation has been successful in securing a minimum quality in an urban environment that is rapidly growing and does not have time to slowly adapt to its environment. In this process the interpretation of individual and local needs in the urban environment becomes far more difficult, which at the same time increasing the powers of the controlling party.

4.9 Local Norms and Conventions: Interpretation of Needs

The aim of this section is to provide an example of the ability of a local system of norms and conventions to regulate the building process according to the needs of individuals and the local community. These needs differ from those objectives put down by the state. The example taken here is of traditional Arab settlements. It recognises their ability to transform not only physical, but also cultural and social needs. These norms and conventions are complex, covering many aspects of the environment and the people who lived in them, yet non-restricting and not over detailed. Besim Hakim (1986) covers examples of these in the context of the Muslim City, on which this section is based.

4.9.1 Privacy

Privacy is one of the most important cultural qualities of an Arab City. It is a strong example of the transformation of cultural qualities into the built environment. This cultural norm had a great impact on the traditional settlement form, and was satisfied in a variety of ways. Any opening, whether a window or door, had to be carefully studied. The satisfaction of privacy was made through a number of guidelines as follows.

The height of a windowsill was regulated internally and externally. From the inside, a ground floor window sill had to be a

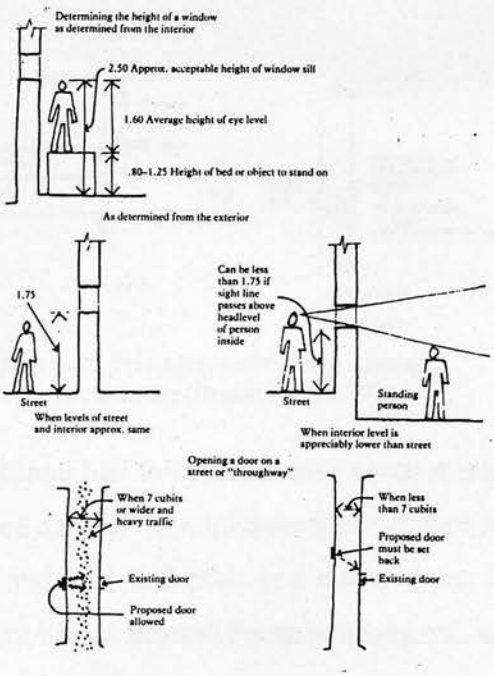


Fig: 4. 12 Norms controlling window heights to achieve privacy in traditional Arab urban environments (Besim Hakim 1986: 34).

minimum height of the average eye level of an individual plus the average height of an object such as a bed. On the outside, the minimum height of the windowsill could not be less than the average total height of a person.

Privacy also prohibited creation of a new opening, whether a window or door, opposite existing openings. This norm applied to shop front openings more so than residential openings because of the increase amount of people with access to them. Exemptions were made in the case of wide streets where there was heavy pedestrian traffic because it was understood that the passing traffic would tend to prevent direct vision into adjacent property. Again, the intricacy of the regulatory system shows how adaptations to specific environments were made. Today in Cairo, as a result of the loss of the old norms system and regulation based on international methods, a need for more privacy has been expressed by occupants of new settlements (Amin, M 1994).

4.9.2 Thoroughfare Width and Heights

In spite of a common perception that traditional settlement forms were sporadic, lacked organisation and perhaps regulation, within them there existed often relatively detailed criteria, while at the same time allowing a maximum amount of possible freedom. Examples of detailed guides ordering built form are those used for thoroughfares. Because the camel was a common means of transport and the largest, its measurements were used to determine the dimensions of streets. This means of transport was also used for carrying goods.

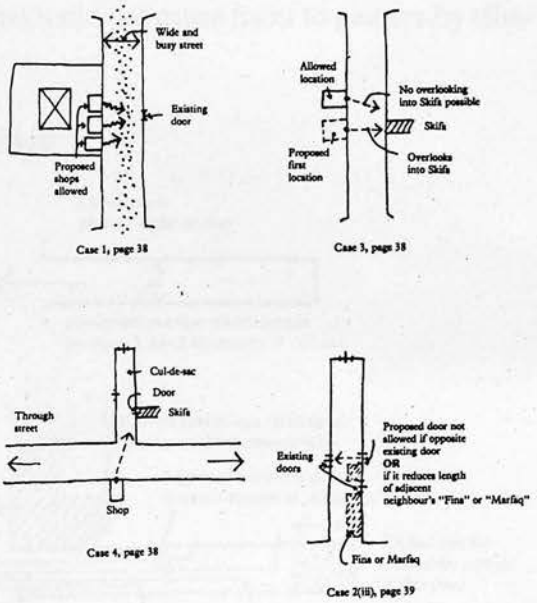


Fig: 4. 13 Prohibition of making openings opposite existing (Besim Hakim 1986: 35).

This meant that the dimensions of the loaded camel had to be taken into account when determining minimum thoroughfare width. Based on this, the minimum thoroughfare was established as 1.84 to 2.00m in a small street and 3.23 to 3.50m in a major street, the second case allowing two-way passage. Minimum height allowed for an archway was also determined at 3.50 m by following the same guidelines.

4.9.3 Right of Usage of Exterior *Fina*

The exterior *fina* relates to a space in front of a built form over which protrusions and cantilevers can be formed. The ability to make extensions on first floor shows that this system was permissive as long as no harm came to others. Protrusions were permitted in the exterior *fina* and overhanging structures as long as they did not prevent access. The length needed for rain water to make contact with the ground via the drainage gargoyle determined the width of a *fina*. The width of the exterior *fina* was recognised to be between 1.8-2 m. At the same time the complete width of the thoroughfare could be utilised as long as the opposite neighbour agreed and that it did not cause harm to passers-by (Ibn-ar-Rami 1982).

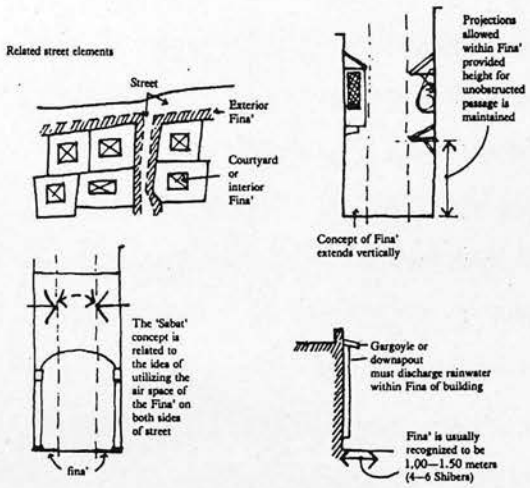


Fig: 4. 14 Right of usage of Exterior Fina (Besim Hakim 1986: 28).

4.9.4 Rights of Original Usage and Pre-emption

Within the traditional Arab settlement form, early residents of a street would have stronger rights than those following them. Original owners have stronger rights in relation to common walls and stronger rights in how they locate their openings whether windows or doors. This is a commonly accepted norm that exists today in some settlement forms in Egypt (Farid, M 1994). Another important right given to preceding residents is that of pre-emption. This right meant that if a property is for sale, early residents have the right to purchase the property over people that are not local provided they offer the same amount of money. This norm strengthens the local community by prioritising local over outside interest. It also allowed original owners to have more power in the local environment, thereby increasing stability and reducing potential conflict.

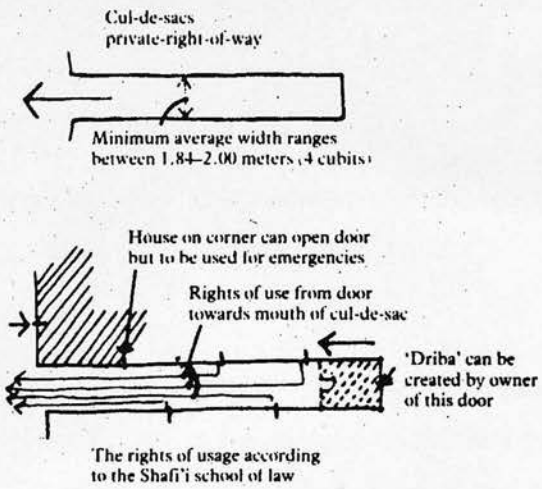


Fig: 4. 15 Factors determining exterior fina (Besim Hakim 1986: 21).

4.9.5 Community Co-operative Responsibility and Ethics

Relative increased authority and responsibility that were in the hands of the local community enhanced their ability to create a system of norms that they could adhere to because of a real existent sense of unity and common purpose. Often such a system had an internal mechanism of justice that was effective and less interventionist. This can be observed in the maintenance and management of the local environment, whereby a property owner's neglect to maintain the *fina* and adjacent street area is punished through shame. The violation of public space in any way is the responsibility of the property owner adjacent to where this violation occurred. Such violations may be storage of goods in a manner that impedes access. This demonstrates a cumulative ability of the local population to manage part of their common infrastructure invigorated by sense of combined ownership over the public realm. It is a co-operative system of responsibility.

Examples of such settlements with high levels of community control, guides and norms varied significantly in different locations and eras. This is in contrast with common applicability of regulation found today. The traditional regulation of the built environment represents a translation of local cultural values and needs, which differ from modern regulation that enacts the objectives of an authority outside the local system (Hassan, H K 1989).

4.10 Practical Initiatives and Notions

The following are several initiatives and notions that define a local order within the context of the built environment in different ways.

4.10.1 The Built Environment as an Ecosystem:

The application of regulation with objectives that do not stem from the local environment can have far-reaching consequences. In effect the built environment may be seen to be as complex as the natural environment, where species and organisms are paralleled by different built forms and spaces. Regulation has been known to have similar effects on a built environment eco-system as that of introducing pesticides into a natural system. Chemicals inevitably filter through to affect all animal and plant life. Similarly interventionary regulation can have far and unforeseen effects (Akbar, J 1988: 52).

An example of this is seen in the over-regulation of the housing market in Egypt which was completely opposite to those good intentions of the state. Shortages in housing in 1947 caused inflated rents in the market. The state tried to remedy this problem by issuing a decree capping rents prior to 1944, while those after would be exempt. The idea was to encourage more building of housing. Instead it caused an increased rents and exacerbated the problem further. These decrees heightened the tension between lessors and lessees. This tension resulted in the landlord, because of the loss of a financial incentive and gain, not maintaining the property. Landlords would look for loopholes in the law to increase rents and this in turn would result in more counter-regulation. In the end this led to increased corruption and bribing of civil servant officials which became common practice. The cycle of events shows a similarity with insect life, which acquires immunity against new forms of pesticide all the time. To bypass state regulation landlord and lessee would agree on an initial fee that would be paid to the landlord as an initial top up to the renting price (Soliman, M 1996). This would be a substantial fee (a percentage of the buying cost) yet no ownership rights were given to the lessee. In this case, regulation worked against the original objectives of the state and had uncalculated effects. Today the state is reverting and de-regulating the market.

4.10.2 Co-housing

Co-housing is a concept whereby a group of individuals agree between themselves to build and manage a property for their combined use. It is usually done in order to provide good affordable housing. Members can take part in the management of the building process and later in the management of the common facilities that they may share. This is an example whereby a group of individuals initiate a system of norms and rules between them for their common benefit. Co-housing is an approach characterised by:

- *Participatory process: Residents organise and participate in the planning and design process for the housing development, and are responsible as a group for final decisions;*
- *Intentional neighbourhood design: The physical design encourages a strong sense of community;*
- *Extensive Common Facilities: An integral part of the community, common area designed for daily use, to supplement private living areas;*
- *Complete Resident Management: Residents manage the development, making decisions of common concern at community meetings.* (Mcamant & Durrett 1988)

4.10.3 Owner Unions (Aswan Tower Owner Union)

In the city of Cairo a new approach is evolving towards the management of apartment buildings. Property owners decide to create a co-operative in order to manage and maintain their properties. The union should meet on average once a month when decisions are made on how to maintain their common property and sometimes solve disputes between residents. Elevators, staircases, plumbing and water supply, and the garage are among the things they have to deal with. A marked improvement in the maintenance and general up keep of the buildings is found where co-operatives are involved (Aswan Tower Owner Union 1996). Today, owner unions are being instated in law with varying success. This is because creating these co-operatives differs when it is being done through choice rather than being forced on owners.

4.10.4 Neighbourhood Forums and Councils

These are similar to owner unions but on a wider level. A group of residents in an area will decide to create a local community council that can manage and look after the interests of those living in the area. Forums are conducted for members to communicate their needs to elected representatives who in turn communicate with local authorities. This is a grassroots concept that is increasing but is not yet structured in the state system. It is still a young concept that is growing and needs support from the state.

> *To be effective an advance in this area would require fundamental decentralisation of power by government. In the meantime neighbourhood forums will still have an important role.*
> (Knevitt & Wates 1987: 127).

4.10.5 Neighbourhood & Street Watch Schemes

Such schemes are generally found in areas where police are unable to tackle extensive crime. In these schemes the local community works with the police and is given authority to patrol streets and report any offences to the police. In some cases in Britain communities were permitted to set up their own neighbourhood watch schemes with cameras. It is agreed that members should be communally elected, but sometimes anyone who is willing to volunteer services is welcomed. These represent an initiative by local people to manage their own neighbourhoods (Knevitt & Wates 1987).

4.10.6 Community Architecture and People Participation

Previous initiatives and many others define a new phenomenon and movement of Community Architecture. It is a product of a different system producing very different

qualities. Knevitt & Wates illustrate these differences between community and conventional architecture in community architecture. This new architecture has a number of qualities (**Fig: 4.16**).

	Conventional architecture	*Community architecture*
Status of user	Users are passive recipients of an environment conceived, executed, managed and evaluated by others: corporate, public or private sector landowners and developers with professional 'experts'.	Users are – or are treated as – the clients. They are offered (or take) control of commissioning, designing, developing, managing and evaluating their environment, and may sometimes be physically involved in construction.
User/expert relationship	Remote, arm's length. Little if any direct contact. Experts – commissioned by landowners and developers – occasionally make superficial attempts to define and consult end-users, but their attitudes are mostly paternalistic and patronizing.	Creative alliance and working partnership. Experts are commissioned by, and are accountable to, users, or behave as if they are.
Expert's role	Provider, neutral bureaucrat, élitist, 'one of them', manipulator of people to fit the system, a professional in the institutional sense. Remote and inaccessible.	Enabler, facilitator and 'social entrepreneur', educator, 'one of us', manipulator of the system to fit the people and challenger of the status quo; a professional as a competent and efficient adviser. Locally based and accessible.
Scale of project	Generally large and often cumbersome. Determined by pattern of land ownership and the need for efficient mass production and simple management.	Generally small, responsive and determined by the nature of the project, the local building industry and the participants. Large sites generally broken down into manageable packages.
Location of project	Fashionable and wealthy existing residential, commercial and industrial areas preferred. Otherwise a green-field site with infrastructure (roads, power, water supply and drainage, etc.); i.e. no constraints.	Anywhere, but most likely to be urban, or periphery of urban areas; area of single or multiple deprivation; derelict or decaying environment.
Use of project	Likely to be a single function or two or three complementary activities (e.g. commercial, or housing, or industrial).	Likely to be multi-functional.
Design style	Self-conscious about style; most likely 'international' or 'modern movement'. Increasingly one of the other fashionable and identifiable styles: Post-Modern, Hi-tech, Neo-vernacular or Classical Revival. Restrained and sometimes frigid; utilitarian.	Unselfconscious about style. Any 'style' may be adopted as appropriate. Most likely to be 'contextual', 'regional' (place-specific) with concern for identity. Loose and sometimes exuberant; often highly decorative, using local artists.
Technology/ resources	Tendency towards: mass production, prefabrication, repetition, global supply of materials, machine-friendly technology, 'clean sweep' and new build, machine intensive, capital intensive.	Tendency towards: small-scale production, on-site construction, individuality, local supply of materials, user-friendly (convivial) technology, re-use, recycling and conservation, labour and time intensive.
End product	Static, slowly deteriorates, hard to manage and maintain, high-energy consumption.	Flexible, slowly improving, easy to manage and maintain, low-energy consumption.
Primary motivation	*Private sector*: return on investment (usually short-term) and narrow self-interest. *Public sector*: social welfare and party political opportunism. *Experts*: esteem from professional peers. Response to general national or regional gap in market, or social needs and opportunities.	Improvement of quality of life for individuals and communities. Better use of local resources. Social investment. Response to specific localized needs and opportunities.
Method of operation	Top-down, emphasis on product rather than process, bureaucratic, centralized with specialisms compartmentalized, stop-go, impersonal, anonymous, paper management, avoid setting a precedent, secretive.	Bottom-up, emphasis on process rather than product, flexible, localized, holistic and multi-disciplinary, evolutionary, continuous, personal, familiar, people management, setting precedents, open.
Ideology	Totalitarian, technocratic and doctrinaire (Left or Right) big is beautiful, competition, survival of the fittest.	Pragmatic, humanitarian, responsive and flexible, small is beautiful, collaboration, mutual aid.

Fig: 4. 16 Coventional and Community Architecture (Wates, N & Knevitt, C 1987: 25)

4.11 Chapter Summary

- The first section clarified the importance of regulation and its effect on the built environment. How modern law and its application to the built environment came to be, and opinions on how planning regulation has affected settlements in contrast to the more traditional order system, require recognition;
- The model of the *forms of submission* was introduced as a methodology to evaluate control and locate responsibility within the built environment, and then observe how this has affected quality;
- The research introduced the notion that control over the architecture must be considered over the life span of built form. Hence phases of formation, management and maintenance and adaptation must be considered separately;
- Infrastructure as an integral part of the built environment was identified and analysed in terms of its ability to conform to responsibility and control;
- Observation of methods and objectives of state regulation;
- Observation of the traditional Arab settlement and its internal norms and conventions. This system identified local needs of the society while not inhibiting individual freedom and responsibility;
- Finally, several initiatives and notions taking in to account community control and responsibility as a methodology for improvement.

4.12 Formulations and Conclusions

These can be understood as comprising the following assertions:

- Control over the local environment through norms and conventions creates a built form that is well adapted to local needs, whether of the individual or the whole community, also whether this is a single built unit or the overall urban form;
- This pattern of control not only determines the physical form, but also the norms regulating the built environment;
- The system of norms is one of local self-management and responsibility;
- The mechanism of incremental growth shows an ability of the built environment to adapt, to physical qualities of the topography;
- Increase of user control contributes to the appropriateness of physical form;
- Authority and responsibility is determined entirely through law in a modern system. It determines powers given to owner, controller, and user;

- Communities are sometimes able to regulate the built environment with intricacy, yet allowing an appropriate amount of freedom to shape according to individual needs;
- Traditional and organic built form can be seen as a translation of environmental and cultural characteristics of the society;
- Organic form is balanced between diversity of form and unity of style without the need for professionals;
- The modern built environment is characterised be standardisation and uniformity caused by common application;
- The modern system is able to install political and physical objectives of the decision-maker such as health and safety, and minimum standards of execution. It also installed general state policies such as those of housing.

4.13 Indicators for Assessment of Control in the Local Environment

The following is a list of indicators based on *local order system* function and will be used later in the case studies to observe local control:

1. Levels of control given to localities (local communities and government);
2. Prevalent forms of submission found in the settlement and percentages of each form and the type of architecture associate with the forms;
3. Size and remoteness of the parties involved in the forms;
4. Strength of the claims (*owner / use / control*) identified through government law or local norms;
5. Existence of local norms governing local community;
6. The strength of community ties and cohesion between individuals;
7. Co-operative control over common property and the existence of a decision-making process;
8. Ability of community to manipulate parts of the infrastructure;
9. Deduction of control and responsibility in the different phases of control built environment, i.e. defining the forms in each phase.

CHAPTER FIVE
Economic Activity

Economic Activity

5.1 Introduction

Economy plays a vital role in the evolution of any settlement. Obviously if there is no economic activity for people to earn a living there will be no viable community. Today, economies are the outcome of a network of global dependencies where changes in one market sector can affect a local economy on the other side of the world. Consequently settlements evolve, flourish or disappear as a result of changes in global economy. One powerful example of this is the shipbuilding industry whose collapse due to the loss of a contract can cause severe local deterioration. When a community relies on a large industry, each local job created within the industry there is one or more created outside, making the impact of the collapse of the industry to reverberate far beyond its own workforce. The large number of employment opportunities created by these industries is an incentive for local governments to attract them in spite of a lack of continuity to the local community and the sustainability of its natural environment. This means that a growth or deterioration of the built environment is linked to the success of the local economy. Meanwhile more traditional settlements that have a level of self-reliance and are based on local resources show a quality of relative stability. This quality among others is investigated by researchers seeking the achievement of economic sustainability[1].

Economic activity reflects itself on the architecture it occupies; therefore observation it helps in the understanding of the built form that carries it. Different forms of economic activity from large business to intermediate and to small business will define built form and be reflected in the urban pattern differently. *Local Economic Activity* is the second function of control of the local environment system. The effects of economics on the growth and decline of the urban environment have been discussed in Chapter 1. This chapter identifies the effects of economics at a more local level by observing economic activity as the second function of control in the local environment system having the ability to define its shape. The chapter observes how this function is able to identify different parties and powers, thus defining local control. It attempts to identify how different parties control the built form of economic activity and how this affects the overall urban pattern.

[1] This is discussed in Chapter 2 in the economic goals of sustainability.

5.2 Local Economic Control

There are a number of initiatives that promote local economic self-reliance and control. Their significance stems from an ability to determine the extent to which control can be found within of the local environment system. Although these initiatives define local economy, they also have a bearing on built form. The following sections summarise a number of these initiatives.

5.2.1 Sustainability and Economic Self-reliance

In reaction to the complex negative effects of the globalisation of economies on local communities, sustainability has adopted initiatives of community economic diversity and self-reliance (Bruyn quoted by Roseland, M 1992:219). Economic self-reliance and diversity also imply miniaturisation of the economic activity and local ownership and management. This is not only a goal for sustainability but also a general preference of many that wish to be self-employed. The benefits of miniaturising a local economy are that

> *It improves decision making because the costs of the decision and the benefits from the decision begin to fall on the same community. We do not separate the productive process over long distances. Psychologically, we improve the self-confidence and security of our communities by miniaturising the economy.*
> (Morris quoted in Roseland, M 1992:218)

Local self-reliance does not mean isolation, but qualitative maximisation of natural and built potentials:

> *It means creating an organisational system that enhances the internal economy and cohesiveness of a place, reduces entropy, and provides the import/export relationships with other communities.*
> (Roseland, M 1992:217)

Sustainability, community self-reliance and miniaturisation of the economy are not only positive moves for sustaining the natural environment and curbing pollution, but also for strengthening communities and giving them the ability to shape their lifestyles according to their needs. This also tends towards greater local community and individual control over economic activity, and more sensitive, flexible, and effective management. As the community transforms economic authority into architectural and urban form, there is a discernible effect on the built environment.

5.2.2 Bioregionalism and Economy

Similar to other environmental movements, the primary concern of Bioregionalism is to sustain the natural environment. Albeit as a philosophy, it encompasses other issues facing humanity while it addresses sustaining the natural environment. Economy is pursued with both philosophical and some practical detail. Bioregionalism views *"Economics as a Religious Issue"* (Berry, T 1988:70) that should promote social justice, maintain the Earth's natural systems and be able to sustain itself. This requires economics to determine:

> *its capacity to sustain itself, and the consequences not only for the well being of the human community, but also for the life systems of the earth upon which a sustainable economy depends in a very direct manner.*
> (Berry, T 1988:71)

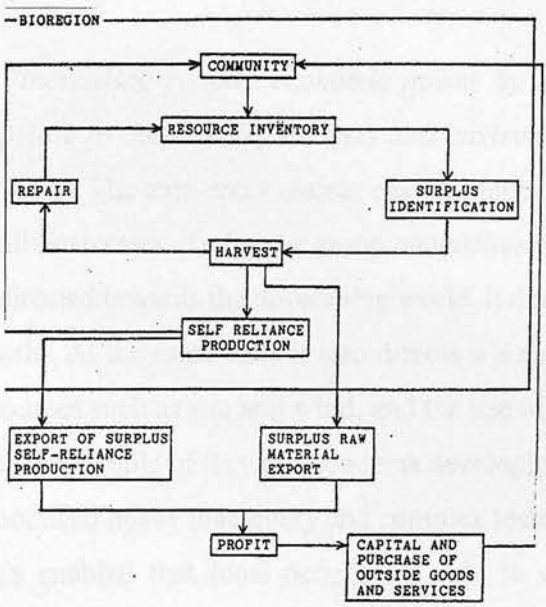


Fig: 5. 1 Bioregional Economic Model (Aberley, D 1973)

Accordingly, some people and place qualities are attributed to economy under Bioregional Principles:

- Extraction from earth within the limits of natural replenishment of its resources;
- Effectively use local raw materials before resorting to imports;
- Maintain local knowledge and local economic self-reliance;
- Promote community owned and controlled economic activity;
- Use non-toxic and environment friendly production methods;
- Use appropriate technologies.

(Alexander, Y 1996)

All these principles promote local control and self-reliance, whether directly by promoting worker owned and community based economic activities or through emphasis on primary

use of local raw materials. Ultimately, relying on local materials, local knowledge and methods promotes economic activities unique to place and helps people/place cohesion.

5.2.3 Appropriate and Intermediate Technology

The concept of Appropriate Technology is expressed in E.F.Schumacher's book *Small is Beautiful* (1969). This concept expresses a need for a new kind of technology to allow for community empowerment and self-reliance. Schumacher proposes the development of an intermediate technology that is dedicated to this cause, and identifies the need for it in both in the developing and the developed world. In order to develop this technology he established the *Intermediate Technology Group* which is a consultancy dedicated technology research

.

The group aims at *"increasing peoples economic power by improving their access to technologies appropriate to their skills, incomes and environments."* (E.F.Schumacher Society internet site 1996). The term encompasses environmentally friendly and small-scale technologies for small businesses. Today the group undertakes much work for the UN and although it is more directed towards the developing world, it does have many applications in the developed world. At the same time it also directs it's research towards the use of alternative energy sources such as sun and wind, and the use of environmentally friendly building materials. One example of its work concerns developing a method for producing roof tiles that does not need heavy machinery and complex technology, but which utilises local materials. This enabled that local people are able to compete with large-scale manufacturing, both on a quality basis while at the same time being cost competitive. This creates more jobs locally than conventionally found as a result of mass production.

5.3 Defining Economic Activity

It is important to define what the study means by the term economic activity. This is any activity by which those who are operating it earn a living. It can mean a many number of things. The built environment can be divided into two categories: those built forms that house people and their social activities such as homes, squares, and Mosques; and those that house economic activity. The latter may take a number of different forms, such as embracing activities that produce goods (from producing ornaments to producing cars) and those that are commercial and service related. Economic activity constitutes a major part of the built environment. The ability to control this segment of the built environment is important in defining overall form. It is therefore important when identifying economic

activity, as the second function of control in the local environment system, to observe the affects of controlling these activities themselves (**Fig: 5.2**).

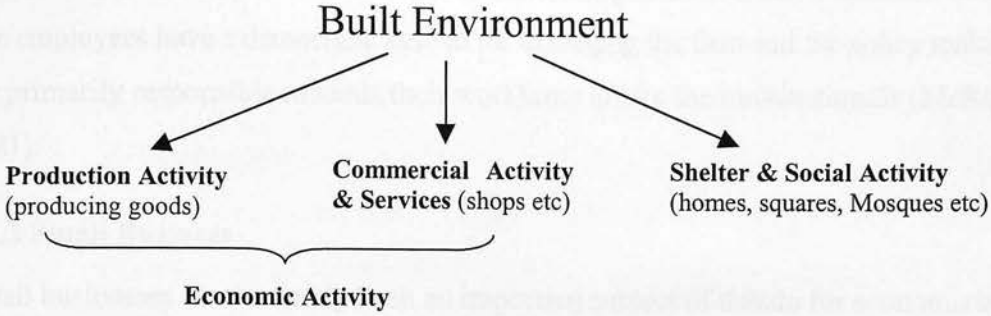


Fig: 5. 2 Defining economic activity in the built environment.

5.4 Forms of Economic Activity

The following section identifies different forms of economic activities in order to reflect on their commitment to local community and their effect on the local environment system. Their definitions are taken from contemporary literature in economics.

5.4.1 Multinationals and Large Businesses

Large organisations can be viewed as systems that are oriented towards the interests of international stock markets, shareholders and top executives. They represent large development opportunities to local governments because of the large influx of capital they bring in addition to a sizable employment opportunity. If they are committed to the place and local community they can be beneficial, but because of their close relation to stock markets and shareholders they must ultimately satisfy the interests in financial benefit before those of their employees. Often relocation of the activity is essential to satisfy such corporate interests. Their location within the urban fabric is usually a centralised decision making process undertaken through planning policy. Accordingly local governments situate these activities within the urban form to suit their needs and to attract more business. Such organisations are criticised for their negative effects on the natural environment and community by "green" movements and by writers such as E.F.Schumacher (1969).

5.4.2 Co-operatives

Co-operatives are intended to create employee oriented industrial activities. They strive to create worker owned and controlled companies. Interest in them arises due to the problems of unemployment created through relocation of large companies. Co-operatives differ from

large corporations in that they seek diversification of activities and do not change location to improve profitability. In short they are *from* and *for* the local community. As an employee controlled organisation they have commitment to the local environment in which they are situated. They tend to be medium sized companies or small businesses and firms. The employees have a democratic system for managing the firm and for policy making and are primarily responsible towards their workforce unlike the multinationals (McRobie, G 1981).

5.4.3 Small Business

Small businesses have recently been an important subject of debate for economists, as an alternative to mass production and multinationals, especially with regard to solving problems of unemployment. Consequently, attempts at revitalising them for job creation and community sustainability are promoted. The definition of small businesses varies, but to economists they are considered to be those businesses providing employment for fewer than 200 employees. Economists recognise that most small business activity is in the service sector. This sort of economic activity is mostly place orientated: *"most new businesses are located close to their founders place of residence"* (Scott quoted by D.J. Storey 1987:73), and are reliant on local resources. There is a strong link between small businesses and self-employment, which often is the objective of the business owner. Their production technologies emphasise craft skills rather than complex technology and mass production. They increase ownership of economic activity locally, promoting stability and a distribution of wealth and at the same time demonstrate a local commitment.

5.4.4 Individual Business

Individual businesses are those providing employment for less than 10 people, and are not recognised in the category of small business (Colin Barrow 1993). This definition is used to identify small businesses in France. It applies to small family owned businesses like shops, and small craft manufacture. The flourishing of these increases local employment because they are labour intensive. They are also more responsible to the local community because they are close to it and because they tend to employ more local people.

5.5 Parties Associated with Economic Activity

The identities of parties related to the built form of economic activities differ considerably from those associated with other built forms like residential units for example. The following reflects on those parties.

5.5.1 User Party

The *user party* of a certain built form is anyone who occupies and uses the diverse functions of the architecture in any way. For an economic activity this means anyone working in or visiting the built form. The primary user parties of the built form of an economic activity are the employees. In the case of commercial activities whether large supermarkets or small shops, consumers are also part of the user party because they use the built form by occupying the architectural form when purchasing a product. Architects are expected to be concerned with maintaining comfort for the diverse users of architecture; consequently deficiency of design will cause from a lack of satisfaction for the user party.

5.5.2 Control Party

The *control party* in the case of economic activity is the state. This is apparent in state regulation focused at such activities. Different forms of activities will differ in their regulation. This can be seen in the difference in regulations as applied to shops or restaurants in contrast to those applied to factories or workshops[1].

5.5.3 Owner/ User Party

This is the party of individuals of an economic activity, which both owns an economic activity and uses it. Small and individual businesses increase this party considerably throughout a community, because these businesses provide employment for their owners. As an employee of the business, the owner is a user, hence combining ownership and user claims. As the owner/ user party increases in the community, economic activity is controlled more locally. In co-operative economic activity, the owner/ user party accounts for all the employees of the activity, therefore increasing accountability to the local community. The creation of more small businesses also increases the size of the owner/ user party.

5.6 Control and Responsibility Reflected in Economic Activity

The following section reflects on the concept of parties and powers as introduced in Chapter 4. They are be applied to the forms of economic activities theoretically in order to observe the transformation of control in the local environment system as a result of changes in the profile of local economic activity. Changes in economic profile perhaps for example changes from relying on large-scale industry to tourism or to craft based communities. Each

[1] Regulation over economic activity is discussed in section 5.10 of this chapter.

will transform local control differently. The following section observes the forms of submission, size and remoteness of parties, intensity of control, and decision making in each form of the activity. The outcomes of the analysis are summarised in **Fig: 5.4.**

5.6.1 Multinationals and Large Businesses:

- *Forms of Submission*

To deduce possible forms of submission of an economic activity we must first identify those parties that own, control and use the built form of the activity. Ownership, control, and use claims all hold within them certain rights in the manipulation of the architecture as defined in Chapter 4. Ownership of these large organisations is complex and changes frequently according to fluctuations in the stock market. The controlling party that dictates the form and location of the architecture are either top executives in the organisation or state authorities and decision-makers. Executives decide the location of the economic activity, which country or region, the specific location of the site, the overall form and shape of the architecture, and choice of architect. But their authority is not absolute. Government policy makers have a strong role in these decisions, laying down general development control policies. They use zoning regulations, building codes, environmental controls as well as other forms of activity controls.

The user parties are those who benefit from and use the built form. Employees in a large factory are a user party of the built form since they occupy during working hours. In the case of large production facilities that employ a large number of people, employees may be a reflection of the local community. In referring a supermarket store, the major user party here is not only the employees but also customers who frequent the store. The form of architecture and its location within the urban fabric affects both customers and users. Although the user party is the primary concern of the architect, they have very little powers of control. The form of submission may be seen as either dispersed or permissive depending on the dominant controlling party. If we observe the state as having the dominant powers of control, the form of submission is dispersed. If we observe company executives as having the dominant powers of control, then it is permissive. This depends on the extent to which the state regulates the activity.

- *Size and Remoteness of Parties*

All parties concerned with this form of economic activity are large whether owners, users or controlling (shareholders, employees, or executives & state bodies). Consumers, as

users, only control by deciding whether or not to buy products from a particular chain, henceforth executives try to *please* them as much as possible and adapt built form to measures of their comfort in order to attract them. Consumers may be large parties, but are not remote. Employees, also users of the built form, are a large party and are not remote, yet they have very little in terms of power to control. The owner party (shareholders) is both large in size and remote. The shareholders have little to do with built form itself and are primarily oriented towards making a profit. Control parties, whether the state or top executives, are large in size but less remote. As company executives, they are not remote and are in close command, while the degree to which the state is remote is arguable and depends on the situation. Both parties that have the ability to control do not easily adapt built form to local environment and community needs because of the complexity of their organisation and because they have different goals.

- *Intensity of Control Exerted by parties*

State decisions are the most influential particularly with regard to the built form of the economic activity and its location within the urban pattern. Controlling powers exerted by top executives is only second to that of the state, but are also very influential and directed towards increase of productivity and the creation of a public image through defining built form. The user party seen in the workforce, which most represent local community is the least influential. Any control over the built form is probably exerted through unions struggling for better working conditions. The third party, the owner party, exerts close to no influence on the built form. The form defined by such an economic activity tends to be concentrated in a small number of facilities but those are large in size and centrally located.

- *Decision Making Process*

The large size of these economic activities is characterised by technological and internal organisational sophistication, which is not accessible to a wider public. They demonstrate centralised control and decision making with little authority for the user party. There is little scope for the individual in the hierarchy of the decision making process. The decision-making process is thus not nested but a polarised one. Whether by the state or the top executives, decisions are made centrally. Individuals and community are unable to appropriate power to directly influence the activity.

5.6.2 Co-operatives:

- *Form of Submission*

Co-operatives are a form of employee ownership and as such are in theory characterised by having a single party for ownership and use of the built form (employees are the user/owner party). Employee ownership of such organisations is manifested in two formulae, either through the initial setting up of an employee co-operative, or by employee acquisition of shares. As they are a contemporary concept, they are governed by state policy. Accordingly, the party of control can either be the state or the owner/ user party, depending on the level of control exerted by the state. The form of submission most representative of this economic activity, is that of co-operative. It can be considered a unified form of submission if relatively little control is exerted by the state on the form and location of its architecture.

- *Size and Remoteness of Parties:*

Co-operatives generally fall into the category of medium to small company, and the size of the user/ owner party can vary according to the company, whether it is a large company or a relatively small one. The controlling party is largely seen in the state, but will be smaller when the user/ owner party takes the claim of control. The size of the parties depend on the size of the business. The user/owner party is strongly involved in the activity, and will not reflect the quality of being remote from the activity.

- *Intensity of Control Exerted by Parties*

Most contemporary societies maintain a high level of control as exerted by central government. The level of control waived to the business is in the hands of the co-operative system that governs it. The greater the size of the co-operative body, the higher representation for local community, henceforth local control over built form of the activity.

- *Decision Making Process*

Such activities by definition are co-operative; i.e. they represent a collective owner/user and a higher level of participation in decision making by those working in them. This organisation is such that if it were not co-operatively managed would not be accountable to its employees. Because it is often a large organisation it is less flexible in the decision making process and is unable to accommodate individual needs within it. Some decision-making powers have to be delegated to central representatives, but because of its participatory nature in general it has a co-operative system for decision making.

5.6.3 Small Business:

- *Forms of Submission*

In this case the owner party of the activity is represented partially by the user party (employees) because most owners of small businesses also work in them. Since the number of employees is no larger than 200, the ratio of the owner/ user party to the total amount of employees is small. The increase of small business in the local environment will increase the number of owners and therefore the potential to increase control over the economic activity locally. Similar to large businesses and co-operatives, the government or owner party will either be the controlling party depending on the level of state control on the activity. The forms of submission will vary according to state control. The business will take a dispersed form of submission when the state is the controlling party. The form of submission however will be permissive if state control of activity built form is weak.

- *Size and Remoteness of Parties*

By name a small business is characterised by small size, which means that owners and employees who are users are not remote. Also they are mostly owner managed businesses. Small size gives greater flexibility and adaptability to the local environment which are reflected in built form in contrast to large business, while enhancing local control over the activity[1].

- *Intensity of Control Exerted by Parties*

The intensity of control of each of the claims will differ depending on the situation. In a modern contemporary built environment where there are strong state controls, the state has a large role. In informal settlements state control is observed to be weak and therefore there are more powers for the owner party[2]. Such an increase in powers to individuals works to increase local control.

- *Decision Making Process*

Because the business is not a co-operative, although it could be, decision making in the business is more central and vested in the hands of the owner. If it is a family business or a partnership decision-making is perhaps more co-operative. Also because it is small in size and there is a close relationship between employees and owners, the experience of those who work in it can be relied upon widening the scope of participation in decisions. Decision-making is generally a far simpler process compared to that of large businesses and

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[1] The contribution of small business to local economy is discussed in Chapter 2 in relation to sustainability.
[2] This is observed in the case study in Chapters 8 & 9.

co-operatives.

5.6.4 Individual and Family Business:

- *Forms of Submission*

Forms of submission of individual business are either unified or co-operative. They are small family owned businesses like shops. They differ from a small business in that they do not fall under the dispersed form of submission, because the number of people employed by the owner/users is small. The form of submission is unified or co-operative, depending on the extent of state control.

- *Size and Remoteness of Parties*

Size and remoteness of their parties are minimal. Parties can not be smaller or more involved with their businesses, except in relation to the state as the controlling party.

- *Intensity of Control Exerted By Parties*

The control exerted by the owner/ user party is maximised because of the closeness to the activity. State control over such activities differs depending on the built environment they are in. In informal and traditional settlements where many such businesses may exist, there is relatively weak state control, which conversely means there is more local control.

- *Level of Co-operative Individual Decision Making*

Decision-making is usually central and taken up by an individual owner. It may also be co-operative when taking in to account the possibility of the existence of a number of owners, as found in a family owned business. They increase the number of owner/users locally and therefore the degree of local cumulative control.

5.6.5 Synthesis of Community Control

To identify the level of local community control resulting from each form of activity, identification of who constitutes community as related to the economic activity must be made. In large industry and multinationals, employees constitute the local community yet they do not have controlling powers. In the case of co-operatives the employees have controlling powers as owners, thus transforming some powers of control to the community. But co-operative businesses are not widespread enough to enact this effect on communities. In settlements dependant on small and individual businesses more control is in the hands of the local community because of a larger number of the owner/ user party, and therefore there is cumulative ownership of local economic activity. This allows levels of individual

and group control over the activities stemming from built form users.

5.6.6 Traditional / Contemporary Economic Activity and Community

There are clear differences between the profiles of economic activities in traditional and contemporary societies and respectively how they appear within urban form. In older settlements and some new ones, mostly in the developing world, economic activity is mainly dependent on very small individual and family businesses and perhaps small businesses. These businesses are located and rooted in their local environment system and depend on local resources. Examples of such are fishing communities and farming communities before the agricultural revolution. This meant that ownership of the activity was widespread. In some traditional and informal settlements, state controls are often weaker, which means that the claim of control was relinquished to the owner party and therefore more powers of control can be found in the hands of the local community. In conclusion more local community control can be found because of two reasons; the first because of an increase in the number of activity owners in a community; and the second because of weak state control.

In contemporary society there is typically a dependency on large businesses and multinationals. These are not rooted in the local environment system and do not depend on local resources except for local labour. Ownership of the activity is not from the local environment but instead ownership is mostly subject to trading in the stock markets anywhere around the world. At the same time, state controls are higher and therefore the claim of control is not related to the local system. In this way control over the activities, how they are located in the built environment, and employment, are less accountable to the local community (**Fig: 5.3, 5.4**).

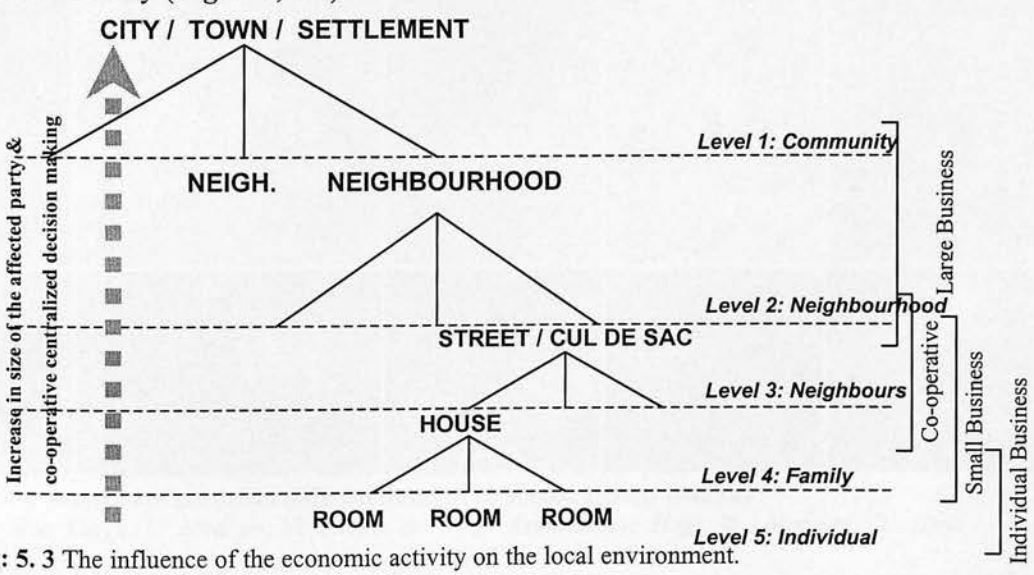


Fig: 5. 3 The influence of the economic activity on the local environment.

Economic Activity	Forms of Submission		Size & Remoteness			Decision Making	Local Influence	Owner User Party	Accountability to local community
Large Business & Multinationals	Permissive	Dispersed	O	L	●	Centralised	Influence on the local environment is high because of the size of the organisation.	Owner/ user party non-existent	Community control is minimal because users (employees) party has no ownership control
			U	L	●				
			C	L	○				
Co-operatives	Unified	Co-operative	O	S	--	Co-operative	Influence on the local environment varies depending on the size and quantity the businesses.	Owner user party dominant	Community control increases due to ownership control of the user party, but less individual control and diversity because of size which are normally larger than small business
			U	S	--				
			C	L	○				
Small Business	Permissive	Dispersed	O	S	--	Individual & Co-operative	Diversity and quantity allows for greater adaptability to the local environment	Owner user party varies in size but increases overall local community ownership	Community control is found through cumulative individual control promoted by such businesses
			U	S	○				
			C	L	○				
Individual Business	Unified	Co-operative	O	S	--	Individual	Cumulative influence on the local environment system	Increases owner/ user party	Cumulative individual and community control
			U	S	--				
			C	L	○				

Fig: 5. 4 Analysis of control in different forms of economic activity (author).
Party Size; Large: L *Medium:* M *Small:* S *Remoteness; High:* ● *Medium:* ○ *Low:* --

5.7 Economic Activities and Built Form Interaction

The forthcoming section provides examples of how built form adapts to its local economic activity. Analysis of control over economic activity in the previous section will enhance an understanding of how these built forms were transformed. This will demonstrate the evolution of a built form as affected by changes in economic activity from their beginnings in subsistence based communities. One effect of economic activity is revealed as direct architectural adaptations of built form and urban form. This section will also attempt to show how the community may be able to regulate this activity through its conventions and an order system, albeit not specifically related to economic activity. Effects of wider ownership of economic activity are noted particularly in agricultural and craft based communities.

5.7.1 Subsistence Economic Activity and Built Form in Endogenous Cultures

In endogenous and relatively more simple cultures, there seems to be strong relationship between the local economic activity and built form. Small communities like those that can be found today in parts of Africa and Asia exemplify these points. Subsistence economic activity first began in the form of foraging and living off the bounties of the land. Basic types of foraging are pedestrian hunting and gathering, equestrian hunting, and aquatic foraging (Michael C. Howard 1989). Later these activities transformed into farming and pastoral activities. As societies grew in size, food production, non-food production and trade evolved. Architecture and built form had also to evolve in order to accommodate these activities and adapt them to social organisation and the surrounding environment.

Native endogenous communities showed a capability to form architectural and organisational adaptations in relation to different forms of activities. These organisations of forms evolved and were initiated within an existing social structure (cultural system) manifesting themselves in the built environment. Variations to different types of activities lead to different organisational forms.

Pastoral communities of central and southern Africa developed a unique type of settlement adapted to their subsistence activity, the circular *kraal*. Variations are found in the form of the *kraal* not only with regard to its subsistence economic activity, but also with changes in social structure. The *kraal* is an enclosure where animals are centred in an open middle pen with individual dwellings situated along the outer perimeter. While the organisation

of the *kraal* is similar in different areas, differences are found as a result of the different environmental and social adaptations (Guidoni, E 1978: 84). The primary wealth of communities based on farming and cultivation is not livestock but seeds and grains. The *Fali* tribe of the northern Cameroon's basis of subsistence is cultivation of grasses. The built form of the tribe reflects this by situating cone shaped granaries at the centre of their settlements. The structure of secondary granaries is linked to those of the dwellings, while cultivation occurred outside the boundaries of the settlements (Guidoni, E 1978: 252).

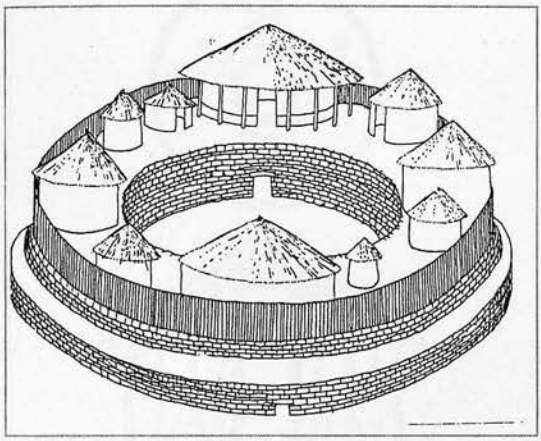


Fig: 5. 6 Reconstruction of a fortified farmhouse with sunken inner courtyard for livestock, Rhodesia (Guidoni, E 1978: 84).

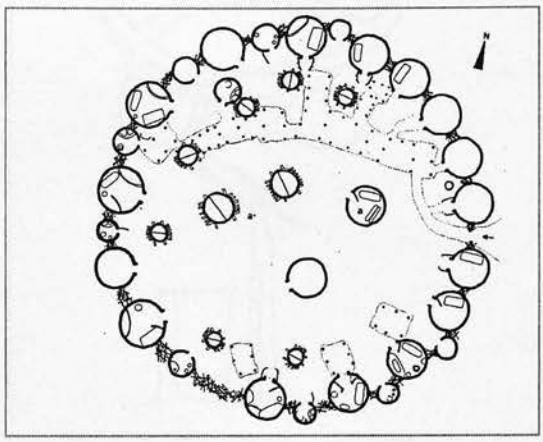


Fig: 5. 5 Schematic plan of a large farm enclosure, Cameroon. Central are the hut and granaries of the head of the family. (Guidoni, E 1978:252).

Expansion of settlements happened when larger scale (non-subsistence) food production, non-food production and trade forms of economic activities were developed. The *Bamileke* tribes in Cameroon show trade functions in their urban form. Commonly the community decides on the location of their market area within their settlement form, where it was determined that it should be situated at the entrance of the settlement, zoned apart from the living areas.

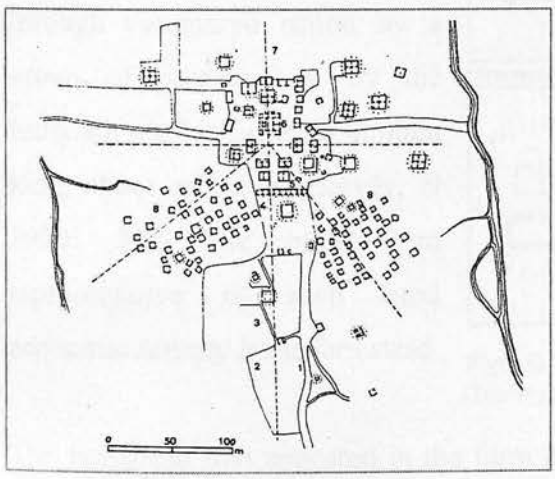


Fig: 5. 8 Bamileke plan of village with central location of market place (Guidoni, E 1978: 282).

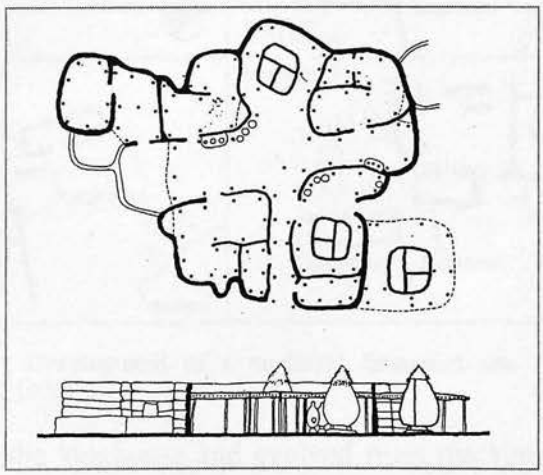


Fig: 5. 7 Plan & section of farmhouse incorporating a granary (Guidoni, E 1978: 282).

Architectural elements and adaptations were formed to accommodate the subsistence activity. Again similar to the *Fali,* granaries are part of the architectural form of the built environment. They are part of the community kitchen areas where both the granary and kitchen forms one unit. Sometimes doorways were specially designed for the prevention of livestock passage, providing another example of a built form adaptation to subsistence activity.

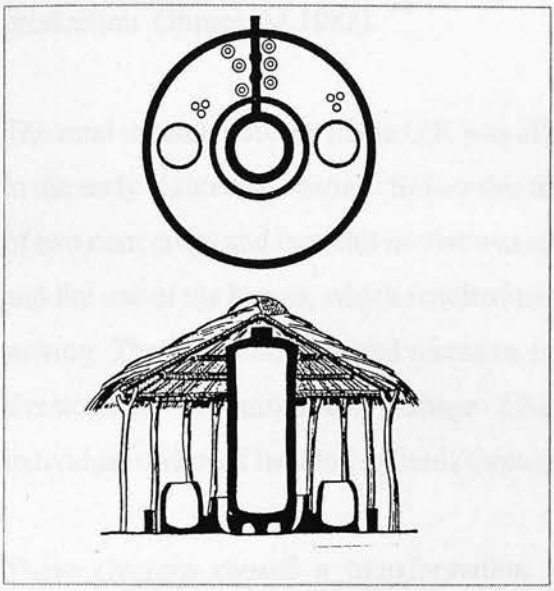


Fig: 5. 10 Kitchens adapted with granary in the centre (Guidoni, E 1978: 290).

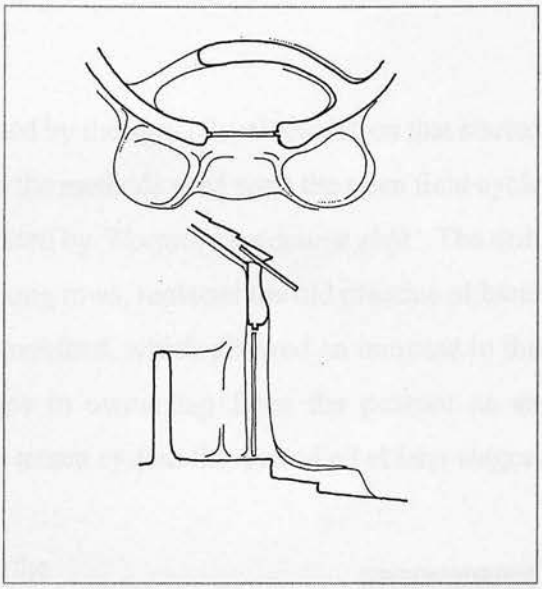


Fig: 5. 9 Doorway adapted to prevent the passage of livestock (Guidoni, E 1978: 290).

5.7.2 Agriculture Based Settlements

Rural communities are characterised by a concentration of agricultural activity. In the U.K the origins of such communities come through communal action by a group of peasants; or by the foundation of settlements through king, abbot or baron (Harvey, N 1970: 30). The built form representative of such rural economic activity is the farmstead.

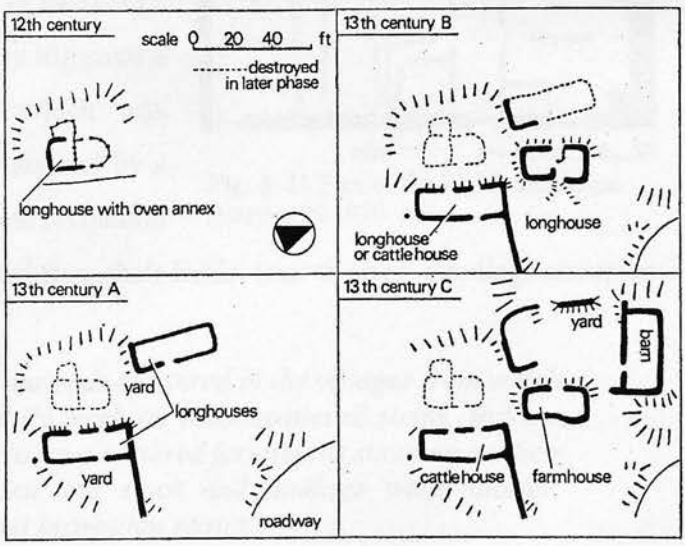


Fig: 5. 11 Development of a medieval farmstead site (Harvey, N 1970: 30)

The farmstead first appeared in the form of the longhouse and evolved from the 12th century onwards to accommodate expansion and need for more space. By the 13th century,

the barn and the cattle house were added to the longhouse site. At the onset these were characterised by an architectural form that accommodated people and livestock within one structure. Their design depended on the type and quantity of livestock that was housed. These were the beginnings of the modern farmstead. The growth and development of the farmstead were accompanied by changes in technology and types of activity. Gradually they accommodated dairy production, straw threshing, piggeries and later poultry production (Bunce, M 1982).

The rural urban landscape in the U.K was affected by the agricultural revolution that started in the early eighteenth century. Before this time the methods used were the open field cycle of two corn crops and bare fallow that was replaced by *`Norfolk four coarse shift`*. The drill and the use of the horses, which required neat long rows, replaced the old practice of hand sowing. These methods created increases in stockfeed, which allowed an increase in the livestock that a farm could manage. Changes in ownership from the peasant as an individual owner of land to landlords through a tenant system that prevailed at later stages.

These changes caused a transformation in the urban form of the parishes[1] that supported agricultural activity. Farmsteads were changed *"in their siting, for these new needs created a radically new pattern of settlement"* (Harvey, N 1970: 73). The changes in rural economic activity triggered a necessary change in urban form which was internally formulated by community and not by a remote authority. Before the agricultural revolution the traditional steadings were separated from their fields, later the new steadings occupied a central part of the farm.

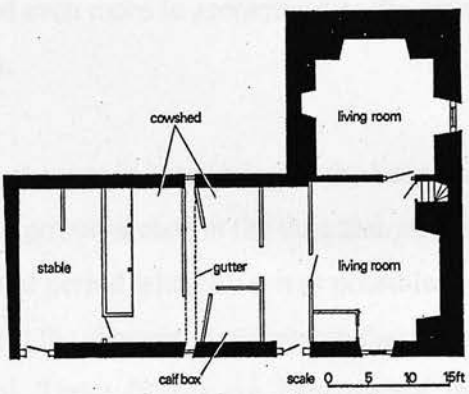


Fig: 5. 12 Plan of the Welsh longhouse (Harvey, N 1970: 30)

> *Traditionally, the lowland farmsteads clustered in the villages from which the farmers went for their daily work on their scattered strips. But the compact farms created by enclosures required farmsteads standing on their own land. Distances for men and stock and haulage were shorter, movement simpler, control and inspection easier.*
> (Harvey, N 1970: 73)

[1] The urban environments housed people working in agricultural activities on the adjoining farmstead.

Because of the dependence on water by the farmstead, this maintained to an extent the old system where farmsteads were located near villages such as in Wiltshire. The workability of the farmstead was more important than the periodical sale of products, which would tend to promote placing them near a road. However this did not continue and the new farmsteads mellowed into the landscape. The old farmhouses became cottages inhabited not by the farmers but by hired labour working for the landowners, whilst some old barns were converted to out-houses (Harvey, N 1970: 74).

When there was a larger number of landowners before the agricultural revolution, there was local accumulative community control over the agricultural activity. This was perpetuated by grazing rights on the *stubbles* and *common land,* which enhanced co-operation between villagers. Law, custom and physical necessity bound the farmer in symbiotic social partnership with his fellow villagers. This was not the case in the owner / tenant system that only sought farm productivity. Parish activity gradually transformed to housing farmstead labour and other forms of economic activities. This was online with the expansion and sophistication of the new farmstead and new abundance of activity it had to house. The farmstead needed larger buildings that later expanded even more to accommodate the new technologies of modern times (Harvey, N 1970: 80).

These settlements showed their capability to adapt to changes in economic activity because of the non-existence of a developed central controlling power or state at the time that would impose its own authority. This permitted a transitional period whereby it was possible to easily accommodate changes in economic activity. Yet the changes in ownership that took place, inhibited a lower level of individual control. These factors are fundamental in understanding the form of those settlements that are characterised by a division of labour living in the old village, from landlords residing on the farmsteads (Harvey, N 1970: 85).

5.7.3 Craft Based Settlements

Production activity first appeared in settlements complementary to agricultural activities *"the pottery workers of Lyvden (Northants) were occupying the normal agrarian holdings within the village, and were continuing to cultivate their land simultaneously"* (Rowley, T 1978:114). In Brill, kilns for famous pottery manufacturers were worked in the backyards. Early activities provided wool, pottery or cloth production in addition to small shops and workshops such as those occupied by the local carpenter. The scale of these early activities

was small and dispersed in the settlements. The concept of home and work was maintained in the form of the settlements cumulatively allowing for local control and the shaping the built environment.

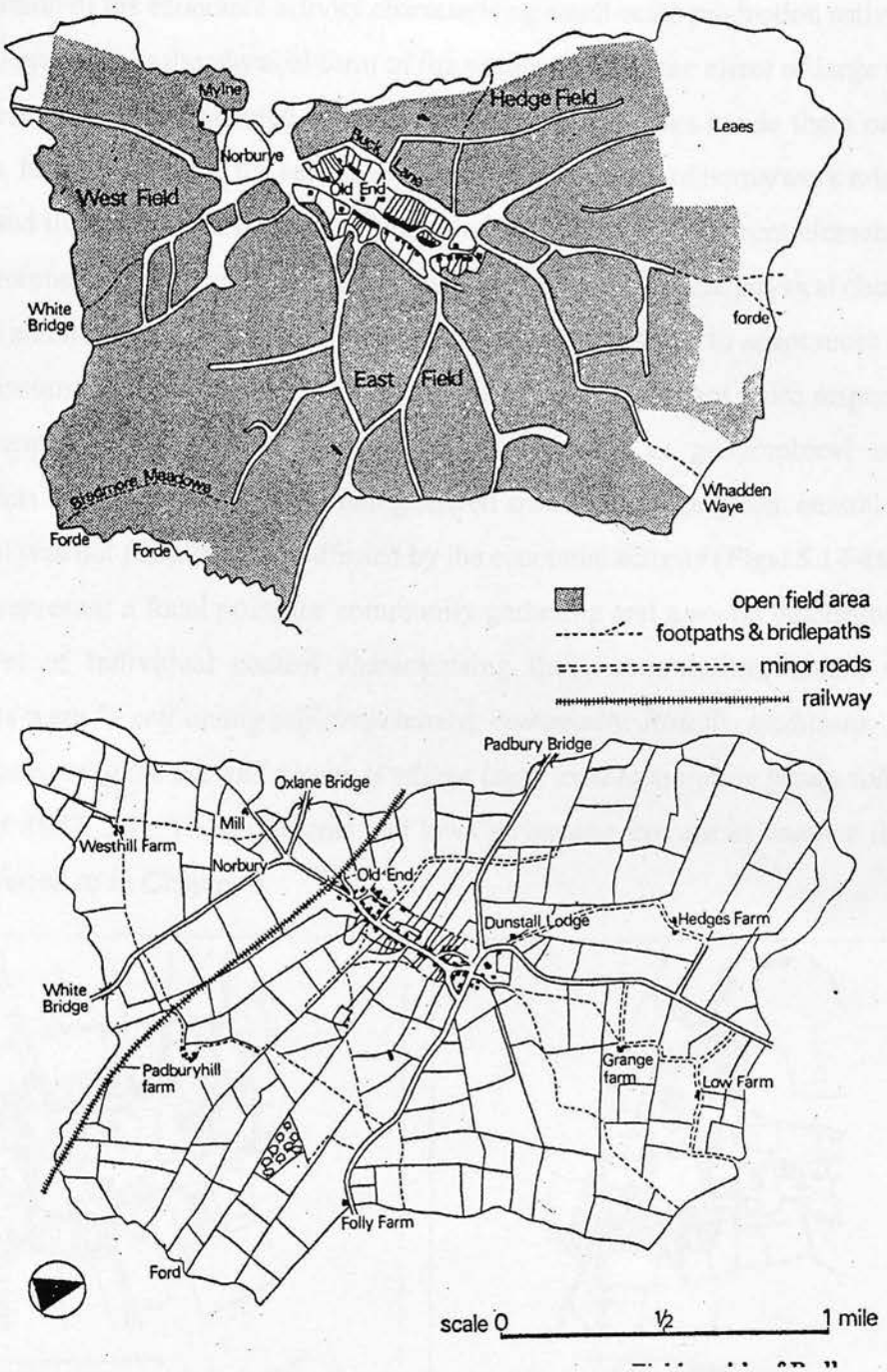


Fig: 5. 13 The effect of the agricultural revolution on rural settlements and transformation from the open field system to enclosure system in the parish of Padbury in Buckinghamshire (Harvey, N 1970: 73).

The cloth-working villages of Cotswolds and Suffolk housed large numbers of independent weavers in the late middle ages and accordingly contained a considerable proportion of smallholdings and cottages; this often resulted in a less regular arrangement than in the wholly agrarian community (Rowley, T 1978:115).

The dispersion of the economic activity characterising small-scale production activity is not as directly apparent in the physical form of the settlement as is the effect of large industry. This is because cottages adapted to accommodate new activities inside them or in their backyards. It also meant that the settlement had a hidden quality[1] of home/work relationship that affected the movement patterns of the individuals between different elements of the built environment and life in the settlement, thus constituting apparent physical change. The small size and number of economic activities also shows an ability to adapt more freely to other environmental factors. The form of the settlement could adapt more responsibly to other determinants other than the base economy, such as geographical or social determinants. The form of the settlement gathered around a village green, central street or church and was not fundamentally affected by the economic activity (**Figs: 5.14-16**). These elements represent a focal point for community gathering and a social determinant. The lower level of individual control characterising these communities meant that the settlements were *"a self-acting self-perpetuating community. Rituals, traditions, customs and laws governing the use and tenure of village lands exist to maintain group solidarity."* (Bunce, M 1982 :34). These customs and laws governing use are in essence the order system referred to in Chapter 4.

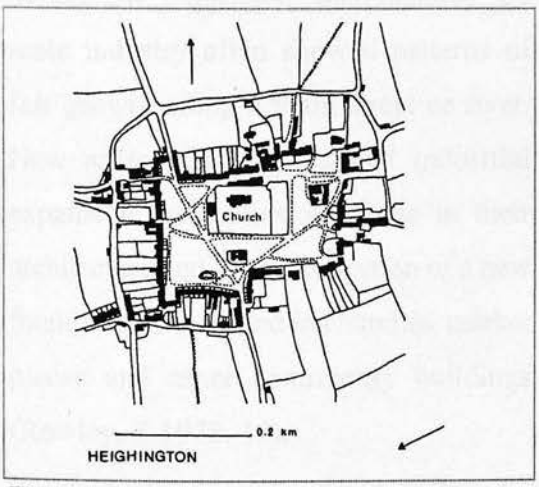


Fig: 5. 15 Heighington, County Durham, example of a village built around a central church (Bunce, M 1982 :35).

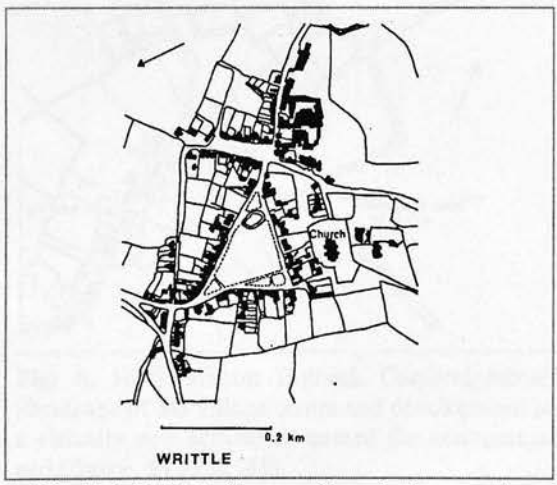


Fig: 5. 14 Writtle Essex, village built around a central village green (Bunce, M 1982 :35).

[1] In other words, it does not need significant changes in the urban form in order to accommodate them.

5.7.4 Industry Based Settlements

The change of economic activity from simple production to industry meant an increase in scale of technology, of production methods and the built form occupied. Radical changes in technology and the financing of industrial activity, are evident in the change of spatial patterns found in rural settlements.

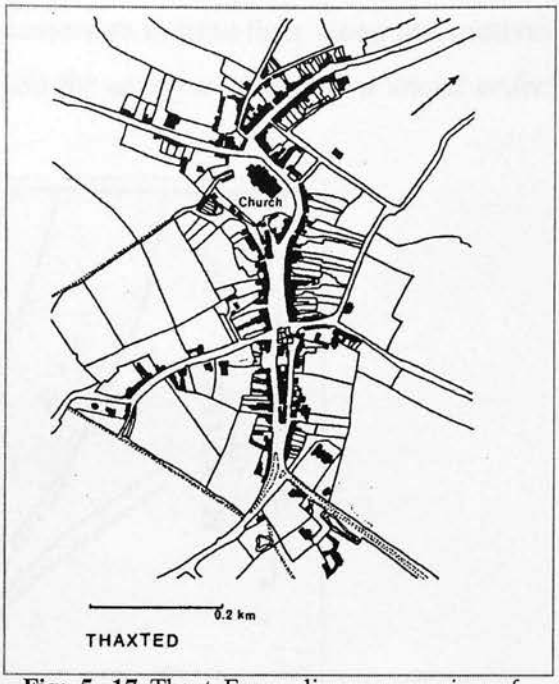


Fig: 5. 17 Thaxt Essex, linear expansion of settlement along road (Bunce, M 1982:40).

The arrival of large-scale industry generally dependant on the availability of an abundance of raw materials, meant settlement expansion was abrupt and thus not directly linked to the old settlement. Architectural elements that are commonly found in both old and new settlements are exemplified by the market place or the parish church that might be wholly or partly built during the new expansions. Settlement expansion accompanied by scale industry often showed patterns of fast growth along a main street or river. New areas that accompanied industrial expansion were more elaborate in their architecture and were a reflection of a new found wealth reflected in churches, market places and other community buildings (Rowley, T 1978: 40).

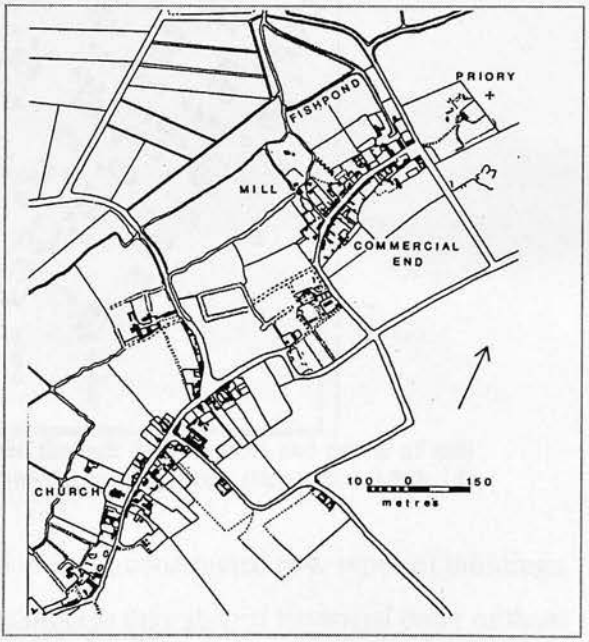


Fig: 5. 16 Swaffham Bulbeck Cambridgeshire. Shrinkage of old village centre and development of a virtually new settlement named the commercial end (Bunce, M 1982 :45).

The strong and fundamental influences that could be exerted on settlement forms by a concentration of economic activity is clear in the early mill villages of Rhode Island, USA. Architectural and settlement form demonstrate a clear example of the changes that may

occur when control of the economic activity is in the hands of a few activity owners as opposed to wider community ownership. Through the control of capital and livelihood of local labour it was easy to manipulate the architecture to suite their views and motives. *"Mill village architecture provided the vehicle for attempts to modify a social order"* (Berry, Susan J. 1992: 24).

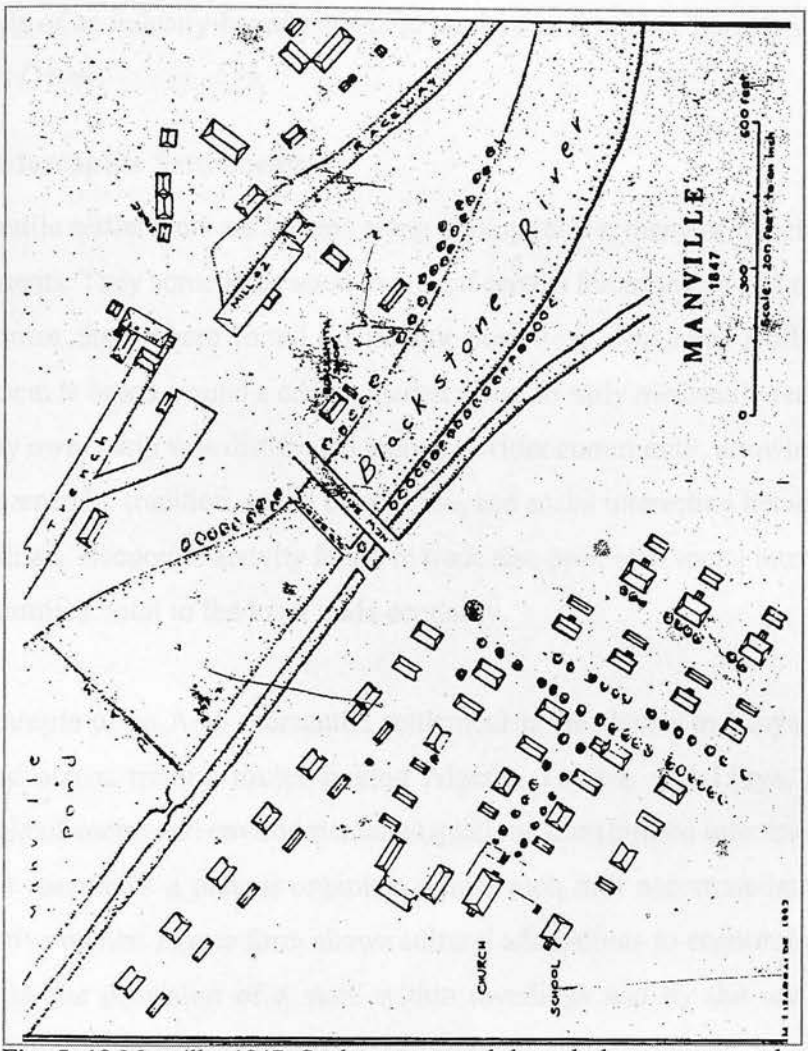


Fig: 5. 18 Manville, 1847. Settlement created through the resources and power of mill owners while the community was secluded from the design process (Berry, S. J. 1992: 24)

The mill owners created new patterns of urban form, constructed new types of buildings, and experimented with housing design. In the process they shaped the social order of those who lived in them. Mill designs were adapted for productivity and to the workability of the mill neglecting worker needs. Mill settlements often lacked schools because mill owners did not recognise their need or commercial benefit of community education. Housing reflected the hierarchy of power to be found within the mill. Different forms and locations of housing would be provided for managerial staff and common labour. Mill designs would be left to engineers rather than architects thus stressing their utilitarian and non-aesthetic

determinants. A church was not constructed and could be located in a schoolhouse. The mill settlement was planned and executed in full by the mill owners. This was a result of their immense power and resources in the community (Berry, S. J. 1992). These settlements are an extreme example of the dominance of economic power and the exclusion of the wider community from the ability to shape their built environment as a result. Another example of an industry-based settlement can be found in New Lanark in the UK created by Robert Owen.

5.7.5 Mercantile Settlements

Mercantile settlements are located along trading routes, many of which are old traditional settlements. They sometimes acted as market centres for areas that had no town near by and sometimes they where found on trading ports (e.g. Antwerp, Holland). The form of settlement is based around a central market place. In early mercantile settlements, economic activity ownership was distributed among a wider community, allowing the settlement to be governed by tradition, social convention, and social interaction between the community individuals. Economic activity found in trade also promoted social interaction with nearby communities, vital to the local trade economy.

An example of an Arab mercantile settlement is Ghadames in Libya. The settlement is situated across trading routes linking Algeria, Tunisia, and Libya. It is a fascinating example of social and environmental adaptations transformed into the built environment. Here it resembles a natural organism where each unit accommodates the needs of its respective owner. House form shows cultural adaptations to economic activity, typically found in the provision of a store within dwellings and by the use of ornamentation throughout the settlement (Abdalla, M 1998).

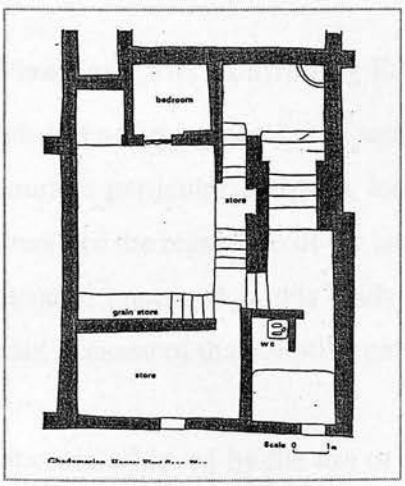


Fig: 5. 19 Ghadames house plan. Note abundance of storage areas (Abdalla, M 1998)

Fig: 5. 20 Ghadames layout, Libya (Abdalla, M 1998).

5.7.6 Outcomes:

The previous examples demonstrate a number of issues about the relationship between economic activity and built form. These can be summed up in the following list of outcomes:

- Home-work relationship was maintained in early communities when a more individual ownership of activity was found in the community. With the increase in scale and technology and decrease in number of owners the form of settlement changed;
- With a lower level of state intervention, the physical form settlements were allowed to adapt more freely to the economic activity;
- Because of the larger number of owners of economic activity, the community was able to structure it according to its needs. Little state intervention meant that the community was able to adapt to their needs as one unit;
- When the industries grew in size the number of owners decreased and hence owners of economic activity were less representative of the community. But early industry owners were closely linked to their local communities from which were their origins. This meant they were inclined to "please" their community.

5.8 Control & Economic Activity Built Form

Chapter 4 discussed those laws and conventions that governed most of the built environment. In this chapter it is important to discuss those laws that regulate the built form of the economic activity in particular. These laws are a reflection of the controlling powers of the state. Their aim is often to separate different forms of pollution from residential areas. Local norms and conventions may play a similar role to state regulation. Sometimes there are particular norms dedicated to economic activity. The following will demonstrate both these systems in regulating built form.

5.8.1 Planning Laws Controlling Economic Activity

The state has a varying number of methods to regulate economic activity. These might be to encourage particular activities locally (such as example the production of cars or computers), or the regulation of the built form of the activity itself. The regulation of built form is more important in this study. Regulation of built form of economic activity is important because of the pollutive nature of some activities.

Regulation is achieved by the use of different development controls of which, land use zoning, densities, building codes, utilities, amenities and infrastructure standards are

commonly used. In the UK, for example, uses are controlled through UCO (Use Classes Order) and GDO (General Development Order) (Cullingworth, J.B. 1994). These are called development controls and classify permitted uses and the possible changes in use of a built form as designated in a particular area of the urban environment. The UCO classifies classes of uses within which change is permitted without the need for planning permission, and those where planning permission is needed. GDOs classify the uses very specifically, and can only be altered or changed by central government. Environmental controls also relate to economic activity and their built form through the ability to specify pollution levels (air, water, and noise) within certain areas hence affecting the proposed location of activities.

Building codes govern the built environment in general but can also be applied to built form of economic activities. Whether land-use zoning, environmental controls, or building codes, all are forms of controlling the development of the built environment, these are state and local authority initiated.

5.8.2 Norms and Conventions

Norms and conventions are how a local community regulates economic activity within their urban form. This was demonstrated in craft based settlements (**5.6.3**). These norms initiated by the community, increased local control and were enhanced by a high number of owner/users characteristic of small and individual business based communities where such conventions are found. This allowed the community to structure its economic activity within its built environment according to their needs and the needs of their activity.

Traditional Islamic communities demonstrate the existence of norms directed particularly at economic activity. The common central law in all traditional Islamic communities is *"Neither `Darar` Nor `Dirar` "*, which means neither to inflict harm nor to be harmed. The vagueness presented by this statement gives a freedom for different interpretations according to circumstance. This meant that each community could adapt the principle to its needs. The concepts affects how and where economic activity is located within settlements. In general an economic activity was allowed anywhere in the settlement because it was viewed that an individuals ability to earn a living should not be obstructed. It was understood that if the activity caused a small level of discomfort to neighbours, then it would continue because it was more important for the activity owner to earn a living. But

if this rises to the level of causing harm, then it would be prohibited. The local community would define what comprised harm and what comprised discomfort. Examples of an activity causing harm may have been, *visual* such as compromising neighbour privacy; or *audible* such as changing building use from say residential to a blacksmith's workshop; or *olfactory* by an activity that creates dust, odour or smoke. In the case of commercial activity, this was permitted more freely than manufacturing activity in the settlement. Such a system controlled all economic activity in the community whether it be commercial (shops), productive (mills), or services (public bath) (Akbar, J. 1988: 95).

The traditional Islamic community like all other traditional communities developed along the lines of individual control leading to overall cumulative local community control, ultimately reflected in the local system of regulation of the economic activity and its built form. Moreover, the system of control over the activities came from within the community. This is an important feature that perhaps should be emulated today. It gives greater freedom and scope for decisions to be made by the individual and community locally in order to safeguard their interests and promote better adaptations.

5.9 Potential Initiatives and Movements

The following sections refer to a number of concepts and intitiatives that are related to economic activity and the way it relates to the urban environment where it is situated.

5.9.1 Mixed Land Use

The way economic activity is structured within the urban fabric affects a number of things among which are transport distances. Diverse forms of economic activity constitute major part of any built environment. The distribution of these activities within the urban form is a determinant of the physical characteristics of the settlement. They determine home/work relationship, home/services relationship, and homogeneity or diversity of the urban landscape in terms of uses.

Mixed land use has become a quality sought after as a consequence of the environmental impacts of segregation and use of zoning laws. Such impacts include physical or aesthetic deficiencies. The most important physical deficiency is over dependence on transport. This directly pollutes natural and urban environments as well as putting great demands on world energy resources. It is these physical effects that led environmental movements and sustainability to seek a mixed land use (Roseland, M 1992). Increased health risks because

of pollution, loss of time and effort are manifestations of commuting distances. At the same time a decline in the quality of urban life can be linked to homogeneity of land use. Urban form has become aesthetically monotonous and social life has lost vitality because of the loss of a multitude of diverse experiences when previously a larger number of activities were found in an urban environment. Segregation and uniformity have affected both the social and physical characteristics of the built environment.

Uniformity and segregation are not only a result of zoning laws, but also a result of a need portrayed by current forms of activity as identified in large business. Prevailing trend towards large scale activities have also promoted uniformity. Commercial activity for example, instead of having the ability to become more evenly dispersed throughout the urban environment as seen in small shops, have become centralised with the advent of the superstore. Factories have likewise replaced small workshops. This resulted from rationalisation and minimisation of cost policies taken up by large businesses. It is also a result of a decrease in the ownership of businesses by a large number of local individuals from within the local community, to a smaller number of individuals that are from outside the local environment.

Edwardo E. Lozano is among a number of writers who have opposed homogeneity in urban landscape. He argues that *"Land use is the single most basic variable determining the form of a community."* (Lozano, E 1990: 131). Urban development he describes as being the result of the contemporary phenomenon of specialisation and well defined single use areas. Planners and urban designers must learn to strike the correct balance between segregation of hazardous land uses and structuring uses in their settlements to enhance social life. They must not confuse a machine using society with a vision of society as a machine in itself (Mumford 1966). There are social benefits in planning and development in rediscovering mixed use preferably within a community centred system which has been adapted to today's needs.

5.9.2 Information Technology

The effect of the *Information Age* on our lives today and in the future is the subject of extensive debate. A fundamental evolution of our lifestyle and hence our built environments are expected by many. These changes are expected in the form of less reliance on physical transport and commuting, to a dependence on electronic transport of

information on an "information super highway", instead of an automobile highway. Information technologies will render chores obsolete such as going to the bank or person to person conferencing. Information technology will increase the potentials of home/ work co-existence. Many companies are currently transforming many of their office staff to home/ work basis through the aid of information technology (Toffler, A 1970).

Such a change allows a dispersion and diversification of a greater number of economic activities and a home/ work place characteristic, thus facilitating place oriented and local economic activity. Information technology is also intended to promote entrepreneurship thereby increasing owner/user parties and facilitating wider community accumulative ownership of economic activity. Information technology holds fascinating future possibilities for decentralisation of economic activities from large cities into the smaller settlements particularly in the service sector, which is expected to show increasing growth rates.

5.9.3 The Urban Village Concept

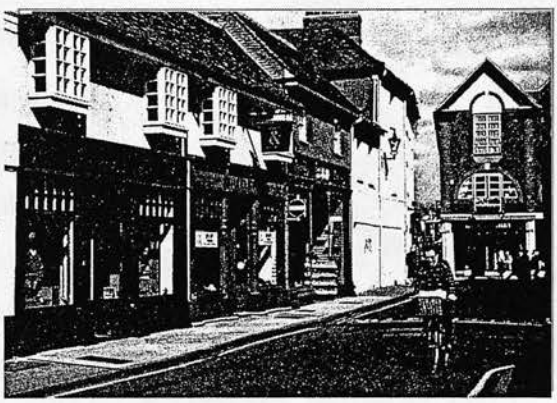


Fig: 5. 21 Urban Village Vision (Urban Villages Report 1992)

The urban village movement is a reaction to the past pitfalls of planners, architects and urban development programs. The movement attempts to create *"communities based on mixed uses, human scale, self-sustaining environment and a sense of belonging."* (HRH the Prince of Wales quoted in Urban Villages Report 1992: 7). The movement is also an attempt to stimulate the characteristics of traditional settlements today. It identifies the need for an individualistic, self-reliant community nature within settlement form and its architecture with the intention of maintaining vitality in urban life. Principles of Urban Villages Movement are:

- Mixed use developments with homes, shops, cafes and bars, offices, studios, workshops, and accommodation for light or service industry. This has the effect of diversifying urban experiences and creating vitality;
- Constant referral to the human scale of the settlement;
- Existence of daily services within walking distance, thus decreasing reliance on transport;
- Sufficient enough settlement size to include needed services and amenities;
- Attempt at balancing home-work characteristic by creating 1:1 ratio between homes and workspaces. Also develop building designs to accommodate work from home. This does

not imply total absence of external commuting;
- Design must cater for the car without encouraging it;
- The creation of the urban village should happen through public involvement.

The implications of this initiative on the structuring of economic activity in settlement form are that it identifies the need for creating a diverse environment, which enhances our experiences. This objective stems from the observation of traditional built environments in comparison to modern ones where there is an abundance of different activities taking place at the same time. The movement is an attempt at revitalisation of urban life and at indirectly creating a locally self-contained economy. Although it claims to use public involvement, it is less fundamental in shaping of the built form and continues to rely on real estate development agencies. A rise in the popularity of this movement demonstrates the lack in accommodating local community needs, which represents its real objective. It also shows a contemporary drive for a traditional urban lifestyle that should be enhanced by new planning and urban design practices.

5.9.4 The Neo-traditional Movement Concept

A parallel movement to the urban village movement in the UK has appeared in the United States of America. The name taken up by the movement in itself shows the thirst for finding another way of living and a dissatisfaction with the current. The goals of the neo-traditionalists are very similar to those of the Urban Villages movement. They promote less dependence on the automobile, creation of mixed land uses, discouraging of urban sprawl, creation of a sense of community, improving accessibility, efficiency of land use and built form, and equity. User participation and control over built form are essential to the concept. The most important application related to economic activity is the ideal of mixed land use.

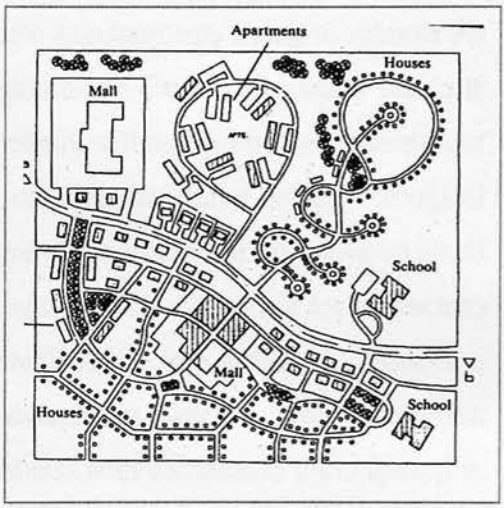


Fig: 5. 22 A representation of (a) suburban sprawl and (b) neo-traditional neighbourhood design (Banai, R 1996)

Mixed land use in both this and the previous initiatives is an attempt at a simulation of the qualitative attributes of the traditional environment, as implied by their names. But it does not seem to be the case that they comprehend the complex nature of the built environment as a system where mixed use is an outcome of a cultural system that is self-regulatory and self-organising. It seems to be, to an extent, a stylistic attempt to emulate traditional built

form rather than to comprehend the local environment system that determines built form. This is a system characterised by local ownership of economic activity and a cumulative power to regulate it within a system controlled internally. It is imperative to comprehend that traditional mixed land use was the outcome of a widespread ownership of the economic activity, and not only an aesthetic need in the built environment.

5.9.5 The Ecovillages Concept

Ecovillages are the closest contemporary attempts to a real understanding of local control over economic activity by a community, combined with implementation to a degree of success. The leading and most successful *ecovillage* is the *Gaia* in Denmark. It represents a model for local control over economic activity. In this example the community maintains a number of very successful businesses rooted in the locally such as production of solar cells, windmills, organic cheeses and meats (Intentional Communities Web Site 1996).

Economic self-reliance is a theme in a number of new developments trying to achieve the objective of sustainability. The new town of Bamberton in Canada is another example incorporating this into its settlement form. The settlement will be built on the principles of community participation, community architecture and neighbourhood design, ecological sustainability and *economic self-reliance*. The proposed economic activity relies on small businesses that are community owned and that are structured by the aid of architects into the settlement form. This project although not yet reality, is a step in the right direction. There are many other such projects, but are not as advanced as these two. These initiatives combine promotion of small community owned business with community participation in the formulation of the built form of settlement (Guy Duncay, Intentional Communities Web Site 1996).

5.10 Local Control Over Economy

In addition to the previous examples, there are some that focus more fundamentally on control over local economics. The following are two of these.

5.10.1 Community Development Corporations (CDCs) Concept

These are democratic organisations designed to be accountable to all residents of a community not just special interests groups such as producers or consumers. Residents become members for a small fee and participate in shaping community policy relating to the local economy and employment. They have the ability to develop land, labour and

capital, and redress any imbalances of power in the community (Roseland, M 1992: 223). They also co-operate with local government in order to portray their local needs and to achieve their objectives. Although not widespread, they readdress the distribution of economic power.

5.10.2 Community Economic Development (CED)

Community economic development is a vehicle to increase community stability through economic development and resources management. It is a vehicle of the state whereby development is directed towards less fortunate communities through economic aid. It is generally practised where there is a deteriorating local economy, and its intention is to take some local control of the economy away from the markets and the state and direct it into the hands of the community (Boothroyd 1991).

5.11 Chapter Recapitulation

- The first section of the chapter dealt with general concepts regarding self-reliant community economics (those advocating the need for it). This initiative can be found not only in debates concerning sustainability, but in the Bioregional movement, and intermediate technology groups;
- The second section of the chapter was devoted to an analysis of the current forms of economic activities (large/ co-operative/ small/ individual business), and their implications on local community control. The aim was to determine community accountability of each;
- The history of the effects of economic activity on architectural and settlement form was demonstrated in the third section, showing how changes in the activity and the structure of control affected the settlement form, and its quality;
- An analysis of the potential economic and architectural concepts that deal with the economic activity and its built form was undertaken in the fourth section. It related them to community and quality of built form. Consequently it identified how a community regulated the built form of its economic activity in the traditional environment, and how this contrasts with a contemporary system of central authority.

Formulations:

- Home-work relationship was maintained in early communities when a lower level of individual ownership was found in the society. With the increase in scale and technology and decrease in number of owners, the form of settlement changed;
- With a lower level of state intervention, the physical form of settlements was allowed

to adapt more freely to the economic activity;

- Because of the larger number of owners of economic activity, the community was able to structure it according to its needs using norms and conventions. Little state intervention meant that the community was able to adapt to their needs as one unit;
- When the industries grew in size the number of owners decreased and hence owners of economic activity were less representative of the community. But early industry owners were closely linked to their local communities because of their origins. This meant that they were inclined to satisfy their community to some extent.

5.12 Control Indicators of Local Economic Activity

This chapter is also an attempt to discuss economic activity as a function of control within the local environment system. At the same time this chapter must identify from these discussions indicators of local control, as portrayed by the second *function of control* which is *local economic activity*. The following indicators, which will be used in the case study, are extracted from the previous material. These indicators are in turn divided into purely economic indicators and those related to built form of economic activity[1].

A- Economic Autonomy

The relevance of the following criteria was made through the analysis and discussion of literature in this chapter. They are used to evaluate the economic control of a local community and not the formation of its built form, as a reflection of overall control in the local environment system. Some of these indicators are similar to sustainability indicators, which stress local economic self-reliance:

1- ***Diversity of Local Economic Activity***:- This allows for stability in the face of changes in economy, and adaptability to change from one form of activity to another. Stability is therefore needed to gain local economic strength;

2- ***Use of Local Resources***:- This strengthens the local economy, and increases local control over the livelihood of the community by its people;

3- ***Economic Activity Profile***:- Determination of the form of activity (large business/ co-operative/ small/ individual) and the prevalence of which, hence the degree of accountability to local community;

4- ***Use of Local Methods & Knowledge***:- The use of community inherent knowledge together with its appropriate development methods, will help a community assert control over its economic activity. This may be found in craft based communities, small businesses

[1] The compilation of all indicators and how they are identified in the case study is found in Chapter 7.

and small-scale industry

5- ***The Scale / Proportion of Local Employment***:- The percentage of community earning a living outside or inside the community, implies a degree of economic autonomy which the community maintains in its built environment;

6- ***The Size of Community Based Activity Ownership***:- Ownership as an element of control, will enable a community to shape its environment. This can be determined by the size of owner/ user inside the community. It is this party which owns an economic activity in one way, and is the user of its built form and by working in it, in another.

B- Autonomy of the Built Form of the Economic Activity

The following are criteria directly related to control over the built form:

1- ***Prevalent Forms of Submission of the Built Forms of the Economic Activities***:- As architecture, the built forms of the economic activity will be controlled through *user*, *owner* and *controller* Claims. Hence this will show their accountability to the user or local community;

2- ***Size and Remoteness of Parties***:- The size and remoteness of a party involved in the control system implies an ability to implement its authority of claim;

3- ***Stage of Control Over Built Form***:- Any built form undergoes three major stages, as suggested in Chapter 4. These are a) *Formation* of Built Form, b) *Management*, and c) *Adaptation*. Each of these stages reflects different forms of submission;

4- ***Existence and Dominance of State Controls***:- The state controls and their form determine the level of internal control permitted in the local environment system. These are in the form of development controls such as land-use zoning, environmental control and building codes governing economic activities;

5- ***Authority Allocated Through Claims***:- Each party or claim holds within it a certain amount of authority allowed to it by law. This may be high, or low according to the laws and the powers of control they allocate;

6- ***Adherence to Local Norms Governing Economic Activity***:- Sometimes there are community norms dedicated to economic activity. These are a reflection of a local ability to manage and regulate, and are an equivalent to state regulation when they address built form.

CHAPTER SIX
Knowledge & Technology

Knowledge & Technology

6.1 Introduction

Building knowledge and technology have a strong role to play in the determination of the shape of the built environment. From the globe shaped igloo made from ice to steel structured skyscrapers, knowledge and methods have had a fundamental role to play. Variations of the arch and dome across time and geographical location and from the use of wood to the use of stone exemplify this. In this light knowledge and technology can be seen as the ability to control form. The origins of the knowledge and methods are an important factor identifying the suitability of their application. Methods of building with mud found in north Africa will fail if applied in wet climates. By observing knowledge as a power to control form, then the identity of the different parties that transform this knowledge becomes significant.

Technology can be seen in a similar light to knowledge when observing its use in the built environment. Its application in settlements is most apparent in infrastructure through the production of electricity, treatment of sewage and water purification. Today these technologies are centrally provided by the state in most cases. This is because of their complexity and cost which prevents the individual or local community from the ability to manage them. In this way the form of technology determines who has the ability to manage it.

Knowledge and technology is the third function of control introduced in this study. The transformation of knowledge takes place through a variety of different parties that hold powers to control form. Similar to the model of parties and powers introduced in Chapter 4, a model will be applied but which takes into account the different parties that transform knowledge. At the same time different forms of technology will be assessed in their capability to be managed locally or centrally. Examples of the implications of this model, which will be called a model of transformation of knowledge, will be observed, as shall technology. In this way it will be possible to assess the powers to control built form through this function.

6.2 Identifying the Model

This model identifies three parties that transform knowledge of built form. These three parties were introduced by Habraken as; the designer who controls the form, the builder who controls the transformation of matter, and the user who controls the use of the artefact (Habraken: 1985). However Habraken did not introduce them in a model as they are introduced here. The following section will identify the different parties that participate in the process of building, each of which are involved through the kind of knowledge they possess.

6.2.1 Designer Party

The designer has not always had a role in the creation of architectural form. The builder or user would often take the role of the designer in traditional settlements. Also in the case of *'Design and Build'* or *'Community Self-build'* initiatives, the designer is marginalised (Holman, C 1996). Habraken (1985) defines designing as to instruct the making of the built form, mostly through two-dimensional representations. This role of the designer is significant in that he or she defines not only form with all its symbolic and functional purposes, but materials and even methods to be used in the building process. Today the designer party must embody the needs of the future user when being commissioned by a developer. The designer is in control of the internal organisation of spaces, external distribution of open space and overall form, in addition to the prescribing of materials, and technical standards.

Size of Party

The designer party will range from a single individual to a large practice, and therefore varies in size depending on the size and complexity of the project at hand. According to the model of the forms of submission introduced in Chapter 4, the size of the party negatively affects the quality of the artefact. In this case however, increase in size of the party will allow for increased specialisation within the party working with the artefact and a larger amount of knowledge can be tapped. This is found in the different individual roles within a practice, such as structural engineers, interior designers as well as the architectural designer. It also means that there needs to be a larger amount of organisation between the individuals.

Remoteness of Party

Remoteness is the second variable by which we can evaluate the different parties. We cannot accuse the designer party of being remote from the artefact they are designing.

They have to be involved strongly with the process since the success of the artefact is their success. However the designer party can be perceived as remote if they are involved in the design but not in the building process itself. This cannot be accepted as the common practice. Having said this, in the case of a large firms remoteness can be exhibited if the designer is not involved in the building process and if he is not acquainted with the local environment and topography. This is to imply that he might use methods and designs that are not suited to the place were the artefact is to be located. This happens in large projects if the designer is not educated in local methods or environmental conditions. The research thus identifies two dimensions of remoteness which affect the artefact, one in terms of the physical vicinity of the artefact and its building process, and the second in terms of acquaintance with the local methods and environmental conditions.

6.2.2 Builder Party

The second party that contributes to form is the builder or maker. This party has had different roles throughout history, from a time when the builder was responsible for everything. We should remember that the evolution of the designer originated from the master-builder / surveyor (Habraken 1985). However the role of the builder can be more clearly seen as the party that chooses the correct materials, is responsible for the structural safety of the building and the application of the correct building standards. To Habraken the builder is responsible for the transformation of matter. There are often overlaps between the responsibilities of the builder and the designer and these can often be part of the same party if both disciplines are part of a development firm.

Size of Party

The size of the builder party is as variable as that of the designer. It is often the case that the builder party is larger than any other party involved with the artefact. This party has grown with the institutionalisation of many professions that has taken place. An increase in the sophistication of the building industry has meant an increase in the number of professionals and specialists needed to execute the artefact such as plumbers, electricians, bricklayers and structural engineers. This cannot be seen as negatively affecting the artefact. With the increase in size of any party there goes with a need for increased organisation between the individuals of the party.

Remoteness of Party

The builder party cannot exhibit remoteness in the sense of being distant from the artefact that is being built. However if we take into account the second definition of

remoteness mentioned before (remote from local environmental conditions), this can be the case. It is caused by centralisation of the education methods used in the building industry and loss of local methods, the same symptom caused by the centralisation of design education. The same education system that influences the designer is responsible for the methods used by the builders.

6.2.3 The User Party

The user party is the third party that can be seen to have control over the creation of the artefact. It is the party closest to ensuring that its needs are satisfied particularly if the artefact is a dwelling. Habraken (1985) explains it as the party that defines the use of the artefact. However the role of the user seems to go beyond the definition of merely controlling the use of the artefact or built form; although it is sometimes the case where the user puts all his faith in the designer and builder. Nonetheless it is often the case where the form is arrived at through close collaboration between the designer and user in order to satisfy the needs of the user as fully as possible. In these instances, the user exerts a significant amount of control over the form, particularly in the building of a home where the user is a small well-defined party. The collective needs of the user are what comprise the needs of the community at large within their built environment. Today, the user party usually has little to do with the "know-how" of the actual building process. In the case of making a home, the user or owner will try to learn as much as they can so as to direct in the creation of their home ideas to suite their needs and wants.

Size of Party

The size of the user party will depend on the artefact. It is an individual or family if the artefact were to be a dwelling. If a developer commissions it, then the designer must embody the needs of the user. However it is not possible for the designer to identify all the needs of the actual user who is to buy and occupy the property. Another possibility can be identified in the case of an owner union where this co-operative will commission the building of an apartment block (an example frequently found in Egypt). Here the user party is large in size. Other examples of the increase in size of the user party are neighbourhood co-operatives concerned with community facilities.

Remoteness of Party

The user party should be as least as possible remote from the creation of the artefact as possible if it is to satisfy their needs. Remoteness of the user party will depend on whether or not the property is bought in its finished form or if the owner manages the building process himself, and how involved he wishes to be in the design and building

of it. The only role the user party typically has when buying a property is the choice of which property to acquire (**Fig: 6.1**). In terms of remoteness from the local environment, the user will be remote if purchasing somewhere not in their place of origin. When the architect designs for the future user as a dweller, they must accommodate the needs of the *average family*. In this way the determinants of the design are similar and therefore design itself becomes repetitive as seen in modern developments. Of course there is no such thing as an average family unit, rather each family is unique in its needs and therefore so should be the form it occupies. This is not just in terms of aesthetic preferences but also in terms of functional needs. The user party may not be remote from the local environment but at the same time might be remote in terms of their knowledge of building methods and techniques. This factor is dependent on each individual and each situation, and is significant in the case of self-build. Here the user becomes a builder or manager of the building process.

6.2.4 The Developer

The developer is a relatively recent party and is responsible for much of the changes that have taken place in the contemporary built environment. The developer has taken the role of the user in defining the use of the artefact, but does not have a strong role in the transformation of the building knowledge itself. However this party has knowledge of economics based on the understanding of the needs of the user and of making a profit from the building market. The developer is typically a large party. In terms of remoteness, this party will show a zeal in protecting their investment and therefore be as close as possible to the project or artefact. This party can show remoteness in terms of knowledge about the local environment because development projects do not necessarily have to be in the local environment where the developer is situated. The strong control of this party has over the built environment means that choice of methods and technology might not always be suitable for the end user. The developer observes built form as a product and not an organic entity. In other words people will purchase their homes rather than shape and grow with them, probably as a result of the "footloose factor" (people relocating from one area to another[1]).

6.2.5 The Planner

The planner can be seen as the party having a knowledge that determines the overall form of the built environment. This party holds within it a form of knowledge, which is

[1] See Chapter 1, p.14.

relatively new. The role of this party was replaced at the community level in vernacular built environments with the mechanism of incremental growth (**Fig: 4.9**). The planner here works at a different level than the architect, user and builder. There are a number of scenarios where the planner can be identified. The first is where the state or local authorities commission the planner. At that level this party works with the control party identified in Chapter 4. Planner knowledge attempts, among other things, to prescribe the needs of the inhabitants at different scales. Such matters that the planner prescribes are numbers and location of schools, road network areas, hospitals, green areas, etc. These were otherwise organically developed at a local level in an organic system. The planner may also be commissioned by the developer party, which has the ability to finance large settlements. It is not possible for the planner to be commissioned by the local community except if there is an organised party to communicate with it.

6.2.6 The Identity of the Parties

The identity of a party whether it be the user, designer, or builder is important. The critical factor about the identity of a party is its relation to local environment. Its significance is not only how it relates to remoteness but also the effect of the success of the artefact on the party. If a designer is from the local community, the success of the artefact is more significant in that it will directly effect the reputation of this party positively or negatively. Likewise the builder will be affected. The user is not subject to the same except when this party chooses to build something that does not respect surrounding neighbours. When the designer and builder are from the local environment the transformation of knowledge will be more locally adapted. At the same time knowledge and methods are constantly being altered and improved to find the best solution to local environmental problems as well as any changes in it.

6.3 Forms of Submission through Transformation of Knowledge

This title refers to the relationship between the main parties that transform building knowledge. This will serve to recognise how knowledge serves as a power of control in determining the form of the artefact and therefore the built environment as a whole. It will also recognise the different parties through which the knowledge is transformed not only at a particular instance and between the parties involved, but through time within the one party.

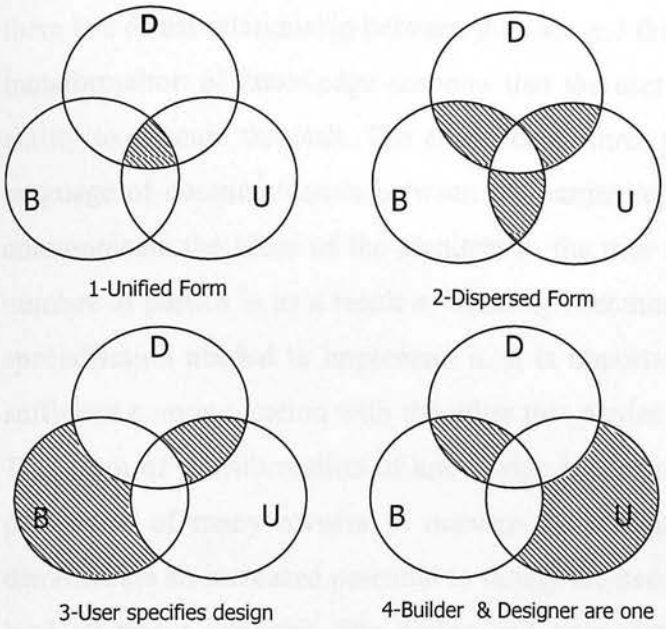


Fig: 6. 1 Forms of Transformation of Knowledge

6.3.1 Unified Form

This form of knowledge transfer has become very rare (**Fig: 6.1**). The unified form indicates that one party designs, builds and uses the artefact. This has been the case in old urban forms and informal settlements. It can be found in old Egyptian villages where homes are built using a simple technology using mud and straw. This form usually assumes that the user has all the knowledge needed to execute the task of creating the artefact. It means that this party is theoretically able undertake the task to its specific needs. This leads to a greater degree of satisfaction with the artefact, and a higher level of success in translating the individuals needs. It means there is one party through which the knowledge is transformed through time and that is the user party. Here the task at hand is simpler since there is not a need for communication between different parties, and the artefact is more controllable. The identity of the party is usually a local one. This means that it has an adequate and workable knowledge of the local environment. Consequently the artefact that is created respects the local environment and the transformation of the knowledge through time builds on past knowledge. The artefact is therefore constantly being updated to suit its local circumstances and to fit user and community needs.

6.3.2 Dispersed Form

This form is more common today (**Fig: 6.1, 2**). It exemplifies the specialisation of roles and functions that has taken place in society. It does not have the benefit of having a fewer number of parties involved. However, a non-existence of a developer means that

there is a direct relationship between the user and the designer and builder. This form of transformation of knowledge assumes that the user or owner party does not have the ability to execute the task. The existence of three parties means that there must be a language of communication between the parties represented in working drawings that communicate the ideas of the architect to the user and to the builder. The increase in number of parties is as a result of building becoming a more complicated task and the specialisation needed to implement it. It is important in this case for the user to have sufficient communication with the other two parties in order to satisfy his or her needs. This form of transformation of knowledge is a common form in Egypt because of the preference of many owners to manage the building process of their homes. It can demonstrate an increased potential to satisfy the needs of the user, and is most typical in land allotment schemes. The design and construction of the artefact may happen in phases in order to correspond to the need of the family unit for more space. If the user has the ability to manage the creation of the artefact then this form of transformation of knowledge usually positively affects the artefact.

6.3.3 User Specified Design

This form of transformation of knowledge refers to situations where there is no specialised designer (**Fig: 6.1, 3**). It usually occurs where the owner and user cannot afford the fee of a designer, and therefore will take design into their own hands. It can exist in the case of recycling old designs when a prospective owner selects a "self-build" kit from a magazine to construct in their chosen plot of land. The designer role is marginalised when a decision has been taken to replicate a prototype design in a number of similar plots. It may be the case that the owner has an adequate amount of knowledge and vision and needs no more than a builder to execute his or her vision. In this case the user is motivated to sacrifice the designer for more than financial reasons. This is not a prevalent course of action because it demands great effort on the behalf of the owner, where this willingness to put in the effort indicates that the home represents an emotional value. At the same time the owner party must have a considerable amount of time at his or her disposal.

6.3.4 Designer / Builder Unified

This form of transformation of knowledge is when there is one party responsible for designing and building and the user party (**Fig: 6.1, 4**). This situation occurs when there is a need to cut the price of building whereby one party will undertake the whole task. It

is sometimes a designer who controls such a party. This party designs and manages the execution of the building process. Such a situation can be a positive quality because it reduces the amount of parties involved and the needs of the user are more easily translated. The user party has more control over the artefact since they are in direct communication with one party which will design and execute the form in totality, ultimately commissioned by them. At the same time it reduces effort on the part of the designer in that he is more able to execute the form according to his and to the users vision. The designer party has more control, and the transformation of building knowledge through time will happen through this party.

6.4 Building Methods

Building knowledge and methods have been transformed across time with varying success. The following section will review some building methods that are locally driven and while identifying the link between the parties that are involved in their evolution. Observing the parties transforming these methods will help to assess their success and failure. The next section aims to clarify the results of the use of a knowledge and technology formed from within the community itself, and if this knowledge has a potential to fulfil the needs of its community. The use of local simple methods and technologies has often been associated with being more environmentally friendly (Aberley, D 1993). This is because both community and environment are part of one system, and maintaining the natural environment maintains their livelihood. What follows are examples of local knowledge and methods, many of which are taken from the Middle East because of the author's familiarity with them and because of the association with the case studies.

6.4.1 Building Methods and Materials of Egyptian Rural Vernacular Architecture

The built form in the old Egyptian countryside is similar to those found in the pre-agricultural revolution era in the UK. The longhouse[1], which characterised that period of time, had an equivalent in Egypt. Both have a space where cattle may be reared within the same structure that housed the family, and both are made from local materials. The following section is a review of the methods used in building within the context of rural architecture in Egypt.

[1] See Chapter 5 for different forms of the longhouse.

6.4.1/1st Wall Construction Methods and Materials

There are a number of ways used to construct a wall by small farmers in Egypt, which vary in the modernity of method. More modern methods incorporate the use of both mud and cement at the same time. Wall construction traditionally used only mud as the basic ingredient. The use of mud as a building material is environmentally friendly and a very good heat insulator as well as being very simple to use by the farmer (Hassan M H K 1990). There are three methods by which a mud wall is built. These are layering, raw brick and filling (Farid, M 1989: 129). The first constitute applying wet mud in layers, where each layer is 50cm high and is applied after the one preceding it dries the thickness of the wall is also 50cm. The materials used are restricted to mud and sand, and have no constituent that efficiently withstands tension and therefore cannot be used to make bricks. The second method is the making of raw bricks from mud, hay and animal manure. The ingredients are first put into brick moulds and left to dry in the sun before they are baked. In this case the wall thickness is not less than 40cm. This method, although using almost the same basic materials, makes it easier to form walls that are more linear in shape.

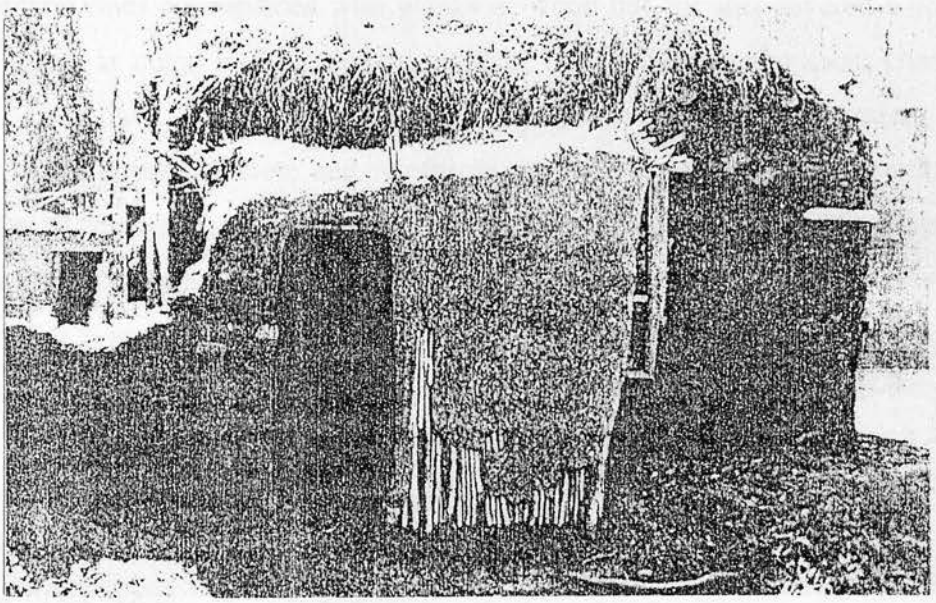


Fig: 6. 2 Rural building method using mud and vine filling (Farid, M 1989:130)

The third method, wall filling, is not used for home construction but for small field shacks in which the farmer rests during the hot ours of the day in the field, or maybe small store extensions resembling shacks. This method is very flexible in terms of the materials that are used. It relies on making pillars out of strong tree branches, palms, or of raw bricks. These are in-filled with any light materials that the farmer can find such as tree vines. This construction is then plastered over with mud mixed with hay. Nowadays the use of red brick and of other building materials by the more affluent

members of farming communities is increasing. However this has happened in an adaptive way, by mixing old and new methods together.

6.4.1/2nd Roofing Methods

Traditional roofing methods vary according to the materials available. Three different methods can be found (Farid, M 1989: 135). The first incorporates the use of thick tree branches as beams to form a structure on which lighter tree vines can be laid. On these a layer of hay is added which is then plastered with mud as a binding agent. A number of layers can be superimposed in this way to achieve in the end a thick sturdy roof that is able to insulate against the heat of the summer. The second method is similar to the first but it uses wooden beams instead of the raw untreated wooden branches. Trays of animal manure are left on the roof of homes to dry in the sun. These are good contributors to the heat insulation of the roof and can be later burnt for heating.

The third roofing method and the most expensive, which at the same time indicates the status of the owner, is building the roof structure entirely of timber. In this case the secondary vines are replaced with planks of wood but are still covered with hay and mud layers as noted in the previous methods. Use of these methods has changed with time. They have changed from wall bearing systems to the more modern methods, which incorporate concrete and reinforced concrete for reasons of durability. Using reinforced concrete is associated with the more important reason of having the ability to make multi-storey homes, therefore making better use of the plot of land and increasing the ability to accommodate the extended family at an affordable price which is a cultural need. This meant an increase in use of reinforced concrete to make multi-storey homes whether employing a wall bearing structure or column and beam method. Until the middle of this last century the use of the more tradition methods prevailed (**Fig: 6.4**).

Building Method	Percentage of Total
Raw Brick Walls	87.9%
Red Brick Wall	9.0%
Filling / Plastering	3.6%
Tree Branch Roofing	88.3%
Wooden Beams & Planks	7.5%
Palm Tree Roofing	3.6%
Dirt Floors	100%

Fig: 6.3 Table of percentage of building methods used in farm villages (1953). The Academy for Scientific Research (1980)

6.4.1/3rd Form and Components of the Country Dwelling

The form of the village dwelling is well adapted to the life of the farmer peasant and his lifestyle. This means that certain characteristics are found in this dwelling that are not found anywhere else (Farid, M 1989: 105). The productive nature of the traditional country dwelling added to it a number of elements that would otherwise not be there. The religion and culture of the people also defined form.

The most notable feature of the dwelling is the barn, an integral part of the dwelling. This reflects the importance of livestock not only for their financial cost but also as an integral part of the livelihood of the farmer in producing milk or working in the field. The barn is often found in the inner most part of the dwelling indicating its value to the farmer and as a security measure. The barn will house a number of different farm animals from those used in the field to those that make daily produce for the family. An area for rearing birds is usually separate from the barn and is typically part of the internal courtyard. Other important elements of the dwelling are the storage room where seed, crop, compost, animal feed, or farmyard equipment is kept. The heat oven is another element of vital importance as it produces the family bread and food and provides heating for the house. It is therefore kept near the middle of the house in order to make most use of the energy that is created from cooking or baking by burning manure patches. There is what is called a "winter room" that shares a wall with the heat oven and is used for sleeping especially in cold winters.

The internal court is a major element in the dwelling. It not only provides circulation throughout the dwelling, sometimes having a staircase in it leading to the roof or upper rooms, but is also the area where the household activities take place. All cooking washing and household shores are executed in this area. In it lies the water source, whether a well or a large fresh water container. The internal court serves a cultural need of enabling the rooms around it to receive day lighting and therefore increases the privacy of the home by reducing the need for window openings on the outside perimeter. It is purposeful in that it enables the sharing of walls between adjacent structures, while protecting against overheating of the overall urban form.

The only element of the home that is not connected to the court is the guestroom which is usually reached from the entrance of the dwelling before encountering the inside and sometimes has a separate door to the outside. This further ensures the privacy of the

household. The *mastaba,* which is similar to an external porch in function, is usually located close to the guestroom. The head of the family uses this element where he rests when he does not have work. From it he can watch passers by and conduct meetings.

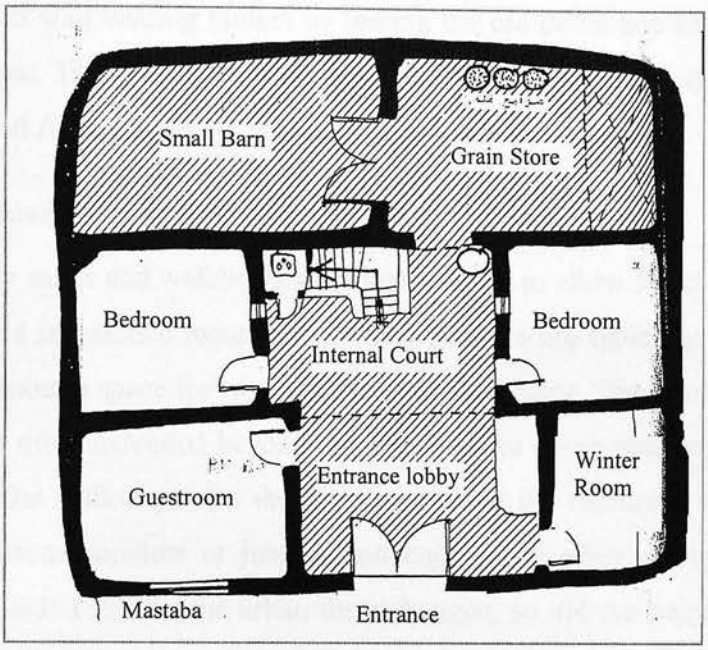


Fig: 6.4 The traditional Egyptian countryside home (Farid, M 1989:110)

The productive areas of the dwelling are the barn, storage room (sometimes with a secondary storage room), oven area, bird pen, and internal court and are related to the subsistence of the farmer. They comprise the major part of the dwelling and can occupy from 40-75 % of the total floor area according to the livestock that the family owns (Farid, M 1989: 108). The economic activity has a strong bearing not only on the form of the dwelling, but urban form as a whole (See Chapter 5).

6.4.1/4th Construction Methods

The traditional building methods rely on the use of mud for supports. The use of mud does not allow for an increase in the number of floors in the way reinforced concrete does. There has to be constant maintenance of the mud structure. This has often led farmers whenever they have financial resources, to use reinforced concrete.

Using only mud makes it difficult to increase the number of floors to the property. This meant that farmers had to use new methods and adopt an unfamiliar building knowledge. Because of lack of experience with this new method, it was used minimally by employing it mostly in a wall bearing system. This in turn allowed for an increase in the number of floors. The adoption of reinforced concrete technology meant giving up

mud bricks, often replacing them with red brick (also produced locally) because the wall was then able to bear the larger weight of reinforced concrete. This did not imply a change in the form of the dwelling itself. When possible, the old mud houses where replaced with wall bearing houses by tearing the old down and replacing them in their original shape. Today column and beam methods are used to further increase the floor areas (Khaled Allam, A 1983) as shown in the case study below.

6.4.1/5th Roads and Walkways

Traditionally roads and walkways were kept narrow to allow for more constant daytime shading. This in practice meant that inner walkways are typically about two metres in width, just enough space for two cattle to pass each other. The insulating hay on roofing of buildings often extended beyond the structures to cover walkways and to add to the shading of the walkways. On these walkways lay the *mastabas* where people would meet and discuss matters or just sit and enjoy each other's company and drink tea (Farid, M 1989: 155). As the urban form changed, so did the heights of buildings, and the walkways lost their organic form.

6.4.1/6th Summation

The researcher has already noted the intricate nature of the elements of the dwelling and how they are linked together according to very specific functional and cultural determinants. These have undergone transformation and change through a long period of time to reach this stage. This was only possible because the user had a very central role to play in forming the dwelling and urban form. This meant there was one party through which this knowledge was transformed and this was the user party. The user had neither the finance to hire a technical specialist, nor was it likely that any person other than the user and owner of the property had as much sensitivity towards his family's needs. This does not mean that there emerged a universally ideal dwelling, but one that perfectly matched requirements according to resources and local knowledge available. At the same time suitability of the urban form indicates the collective ability of the community to define its needs.

Even in the case of the use of new technology in the form of reinforced concrete, this was undertaken in a way where the owner was in command of the overall execution. The community still did not require the use of the designer, but employed local labour that had learnt to use this new system. The traditional methods used local labour and

materials. Although concrete has the benefit of increasing the floor area, it does not live up to expectations in terms of heat insulation in incorporation mud structures. The need for a larger floor space increased the use of concrete, although it was accompanied with the old building methods. The traditional countryside community was able adapt itself to the positive qualities of the new system and to make it more local where by local builders learnt to execute it. This meant that they learned the knowledge locally but had to import the materials for concrete while still producing bricks needed for walls locally. They turned international methods into local ones and used local labour and local materials as much as they could. Finally this example will either result a unified form of knowledge transfer or one where either the user takes the role of the designer with the builder at the same time. There is always a strong will to keep control within making this model as a whole more community orientated.

6.4.2 Hassan Fathy's Local Knowledge and Materials Based Philosophy

It is important to mention Hassan Fathy when relating to the use of appropriate local methods in the building process. The philosophy of Fathy has always had a strong local dimension. It has been associated with building for the poor or building with local materials. He was an "anti internationalist" in architecture, and always advocated the use of local over international methods. This was in part as a means towards the empowerment of local communities in order to build their own architecture as opposed to having it built for them. After the 1963 Egyptian revolution which aimed to empower the impoverished peasant class against a bourgeois society, Fathy felt compelled to convey his opinion to the then president Nasser of his disappointment in the governments decision to use prefab systems to house the poor country farmers (Abdo, A 1990). He suggested instead the concept of settlement housing from a holistic approach, which must involve citizen participation and the use of the traditional building methods. His role in local empowerment in relation to the building process has, ever since, been evident.

6.4.2/1st Use of Local Materials

One of Fathy's principles is the use of local materials in any building. This was a way to give identity to the architecture of each region not only by using the materials in themselves, but also through use of the alternative building methods that employed them. Fathy was largely associated with using mud for building as a result of being associated with building for the poor. However this is not entirely true since a major

part of his philosophy was building with local materials for reasons deeper than financial contingencies. Fathy's philosophy appears in his architecture where materials and methods are always derived from the local environment. Since much of his architecture was dedicated to building for the poor, this meant that the use of mud building was developed to form part of his style of architecture. He was described as the inspiration for mud building world-wide (Hassan M.H.K 1990). He worked with mud in his projects at New Gourna in Upper Egypt and in Baris village. The first was an international project dedicated to resettling a village destroyed by flood and was the source of his widespread recognition through the philosophy he adopted of participation and use of local methods. Fathy when building the villa *Mit Rehan* took to account the location and employed stone instead of mud, again building on the knowledge of local labour. And when commissioned to execute the Nassif House in Saudi Arabia, he used local stone and brick as the basic building material without use of plastering. Other materials such as wood for louvers and window frames was another indication of the use of local materials whether in the form of worked timber or palm tree.

6.4.2/2nd Indigenous Methods Advocated by Fathy

Fathy learned to use the methods for construction that locals had always used. In his endeavour not to use cement because it was foreign to the areas he was building in, he first considered using wood to roof buildings. Since wood is not in abundance in Egypt and the fact that he observed mud brick technology used in domes and vaults in the Nubian architecture of Upper Egypt, allowed him to recognise that this was a more appropriate method. The Nubian method was of particular importance because it meant that there was no need for wood forms in order to lay bricks when making domes and vaults. This was the basic method of building used in his architecture. His refusal to use concrete meant that walls were load bearing.

The principle method of covering space he used was vaulting. As mentioned he used the Nubian methods, which meant that the vaults within resulted were parabolic because the technique used did not need wooden forms. The parabolic shape of the vault was first drawn on the wall. The bricks were then gradually laid tilting on the wall to support them. Other layers would be leant upon the previous ones and rapidly cemented into place using mud-based cement (J.M.Richards, 1985).

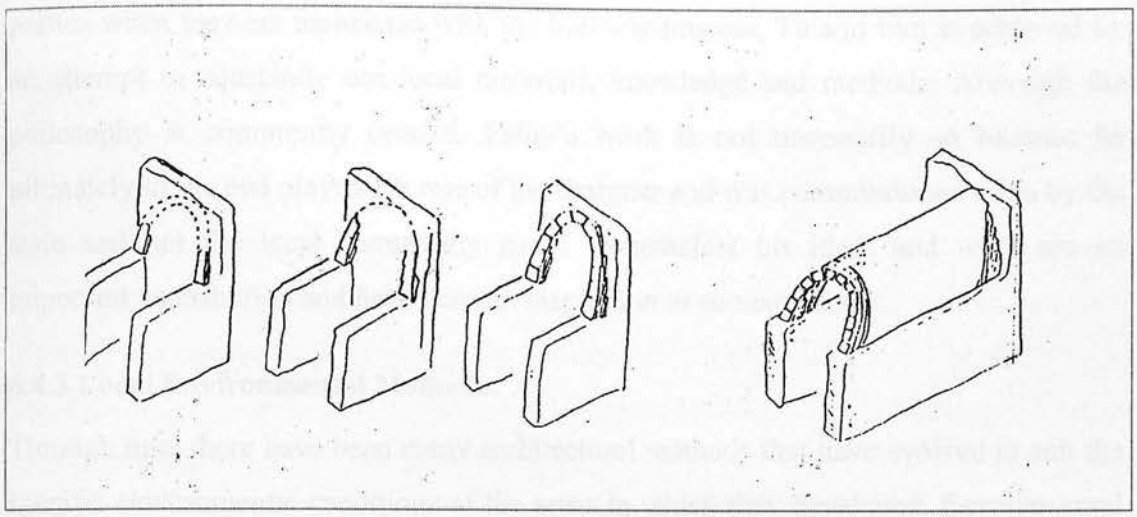


Fig: 6. 5 Vault Building in Nuba, (Fahmy, 1990).

Although vaults can be built using a variety of methods, Fathy used the same technique that the Nubians had developed because it was simpler and cheaper. In the case of forming a dome, there needs to be a transition section from the square walls to the circular form that is the base of the dome. This was done by building triangular buttresses at the corners of the four walls which carried the dome. From these arches the dome was formed on top of the walls. Of course the use of the dome and vault was not only to utilise the capabilities of local labour but also provided superior ventilation qualities in forming high volumes where heat would accumulate and leave the living space below cooler. However, when there was an abundance of wood he used a flat roof when there was a need for more than one floor. In the case of using wood, he still used it in the conventional ways that the craftsmen knew.

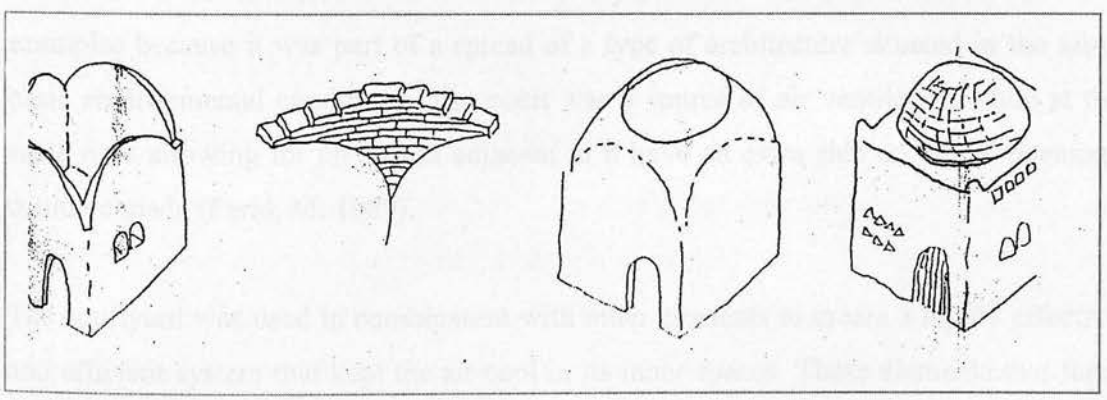


Fig: 6. 6 Procedure in forming a dome, (Fahmy, F 1990).

Finally this philosophy although it is one of an architect, tries to give more power to the local community. This means more power can be attributed to the owner and user

parties when they are associated with the building process. This in turn is achieved by an attempt to constantly use local materials, knowledge and methods. Although the philosophy is community centred, Fathy's work is not necessarily so because he ultimately in the end played the role of the designer and was commissioned often by the state and not the local community itself. Nonetheless his ideas and work are an important contribution and have been an inspiration to so many since.

6.4.3 Local Environmental Methods

Through time there have been many architectural methods that have evolved to suit the specific environmental conditions of the areas in which they developed. Egyptian rural methods are of these. The following will attempt to document others from different places in the world. These have slowly adapted through a process of trial and error at times where there was not a designer to specify them, and consequently were a result of the transformation of knowledge through the user of the artefact.

6.4.3/1st Architectural Methods in Arid Climates of the Middle East

These are mostly concerned with the traditional courtyard house of the Middle East. Some elements of these are found in the rural Egyptian house and in the works of Fathy that were introduced in the last section. The design methods used can be classified into a number of elements used in this area which were specially adapted for their environment, and are all part of what is called the courtyard house. As implied in its name, the most fundamental element of this was the courtyard. This was also a common element in the traditional Egyptian country house, although it was not a necessity for financial reasons. It is easy to see why the courtyard was a common element in all these examples because it was part of a spread of a type of architecture situated in the same basic environmental conditions. The court was a source of air ventilation while at the same time allowing for all spaces adjacent to it have an extra side on which openings could be made (Farid, M. 1989).

The courtyard was used in combination with other elements to create a highly effective and efficient system that kept the air cool in its inner spaces. These elements that form with the court this system include the ventilation tower which channels air through to the court to exit the building. This tower can be furnished with a source of water to humidify the entering air currents. The courtyard may be covered by a form of air vent called a *shoukhshekha,* which is a wooden structured air vent placed above the centre of

the court. Often in the more lavish houses there is a water fountain at the centre of the court providing another source of humidity (El-Aody, S 1985). This air ventilation system was common in the Middle East and evolved through a long period of time. It is not evident if this method developed at the hands of designers or the users themselves as parties. Whether the designer or the user was responsible for the system, the user still had a large role to play in the form because it was he who commissioned the designer. This system can be associated with an evolutionary transformation of knowledge that could have only occurred with maximum local involvement. Other secondary elements were combined with this system such, as the use of the *mashrabia* and submerged window openings, and of course there was a variety of ways in which this system could be used according to the circumstances of site and needs (**Fig: 6.8**).

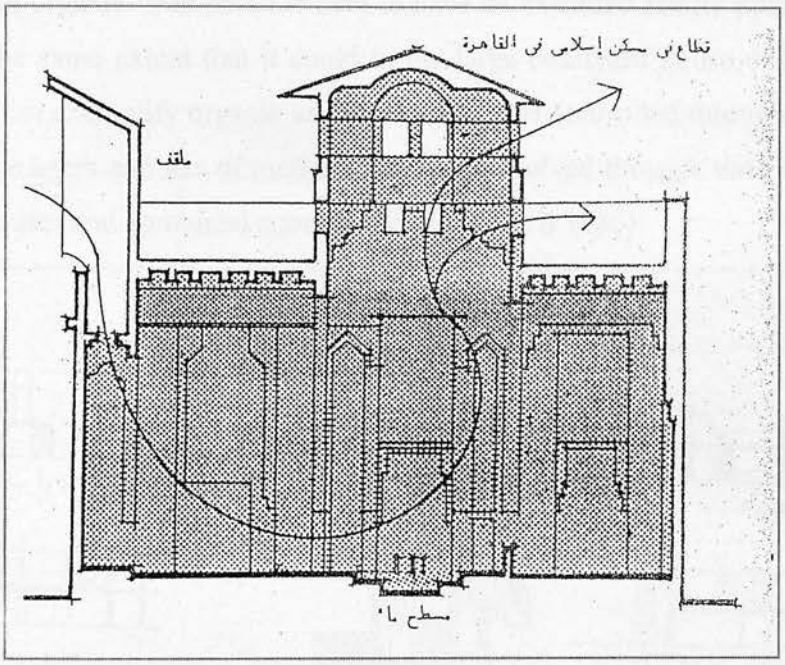


Fig: 6. 7 Section through the courtyard house (El-Aody, S 1985 :111).

6.4.3/2nd Variations of the Courtyard House

The overall form that composed the courtyard house prototype differs from area to area, and differs according to the affluence of the owner who in turn determines the floor area which is needed and the variation of the form most suitable to them. One such example can be seen in the United Arab Emirates in the Bistakia residential neighbourhood. This model displays a large open-air courtyard and the use of a number of large wind towers. This was a very significant social example that demonstrated a vital function of the ability of the form to expand to accommodate the new members of the family. This was a typical nuclear house in which there were a number of families housed in the same

structure, all living together (Jackson, A 1975). In this case the ability to add new floor space was an essential requirement of the design.

An example typical of less affluent neighbourhoods is found in El Kharga in Upper Egypt. In this case the family has to accept far less floor area. Consequently courtyard occupies the minimum area required to allow for ventilation. This example does not incorporate an air vent on top of the court and, although the court is much smaller, it remains open to the air. In both these examples the court functions by providing privacy and ventilation at the same time, thereby satisfying simultaneous social and environmental functions. Dwellings share the same walls and a number of them will combine to form a small residential quarter whose overall characteristics can be highly elaborate and organic. It is possible here to have an extended family although it cannot expand to the same extent that it could in the large courtyard house of Bistakia. Both these examples exemplify organic urban form which is controlled through the powers of the collective users and use of methods that have evolved through time to adapt to the needs of the user and combined community (El Aody, S 1985).

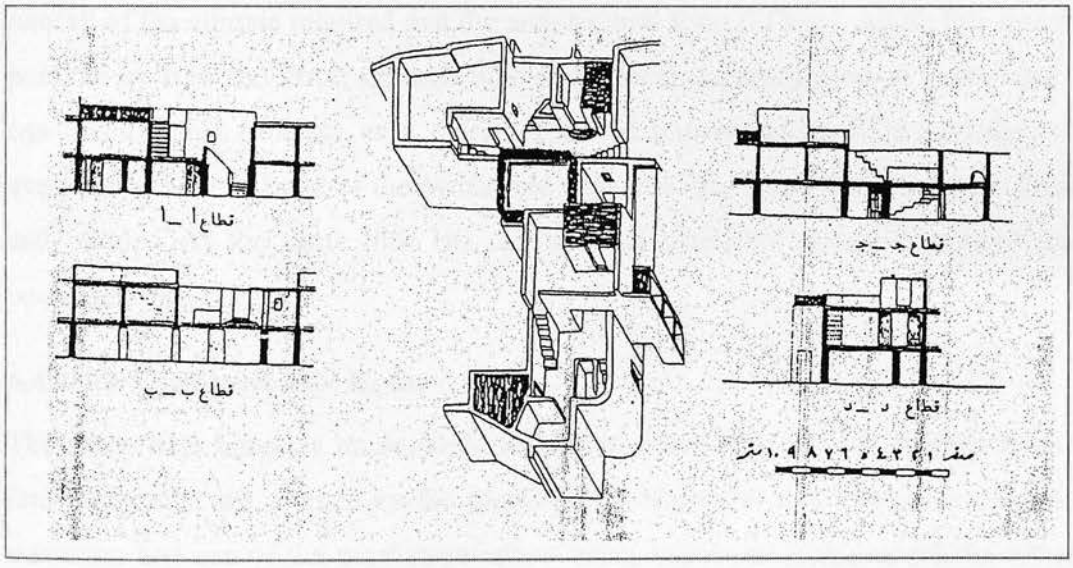


Fig: 6. 8 Courtyard House in Kharga (El Aody, S 1985).

Previous examples of the courtyard house developed at a time when the designer was either non-existent or had a role very much controlled by the user. This means that the form of transformation of knowledge can vary from unified to dispersed. However the input of the user was strong which led to the development of a very effective prototype, as seen in the courtyard house, that was suited to the environmental and social determinants of the place. At the same time the materials and methods used in building were local and the norms that governed the form were user defined.

6.4.3/3rd The Bali House, Indonesia

This unique house is another example of a built form that is adapted to its environmental conditions, and shows a radically different method of air ventilation. The method used separates the different spaces of the single dwelling in order to allow for air currents to pass through. In other words the dwelling resembles a compound of different spaces and rooms. It makes use of local materials found in bamboo and wood to form the dwelling. Both these materials are good heat insulators. All walls and ceilings are permeable to air and therefore enhance the level of ventilation. At the same time the floors of the dwelling are raised and supported above ground level in order to prevent dampness reaching the inside. Because of heavy rains that exist in the area, all roofs are sloped and protrude beyond the outside wall plane in order to direct the rain away from walls of the dwelling (Serag, A 1985).

This is another example of indigenous architecture, which developed through the participation of local people producing successful and unique solutions to resolve their needs. Although it is architecture particularly adapted to hot regions, the humidity and rainfall of the climate required that the architectural form differed. Again this was made possible by trial and error, through time and a local transformation of knowledge. We can identify this example as a unified form of transformation of knowledge where everything is in the hand of the owner and user who also takes the role of the designer and builder. At the same time the use of local materials makes it a more locally controlled one.

6.4.3/4th The Straw Bale House

The straw bale house is an example from America of the use of local methods and knowledge that are adapted by the users. The evolution of this house started with the invention and use of the mechanical straw baler, which made it possible to compress straw into wire-tied bales forming a relatively sturdy building unit. It took homesteaders in timber poor areas to realise the potential of the bale as a building unit in the late 1800s (Steen, B, 1994: 2). This new material developed and was used in different ways. The straw bale structure can be constructed in a variety or different ways. It may be supported by wood, stone or brick, depending on the availability of the materials or constructed without any supports. Supports make the structure more sturdy. Walls are usually framed with timbers that hold them together and straighten out the partitions. Iron rods would be hammered through the wall to reinforce them and tie the bales

together. The bale walls can be plastered with a variety of different materials. These include cement, gypsum, lime and earth plastering. These were applied on steel netting that covered the bale walls, enabling the plaster to stick to the wall. The straw bale house is associated with the use of earth not only as a plaster but also in the making of floors. The whole concept of the straw bale house is associated with the use of local and environmentally friendly materials that are simple for anyone to use and self-build. In this way it is a successful methodology which enhances user control over form by using local materials.

6.4.3/5th Evolution of the Roof Across Time and Geographic Location

There are very many variations in methods and systems used to roof spaces both across time and geographic location. Previous examples have indicated the use of the vault and dome in hot climates like those of the Nuba and in the Arabian Peninsula, and sometimes the use of wood covered in vine for insulation such as those used in the Egyptian countryside. In areas where there are large amounts of rainfall, the sloped roof is commonly used. Although its form is similar, there are many variations. These will appear in the internal structure of the truss and in the materials used to cover the roof. The use of cement, slate, clay, or straw thatching relies on the availability of the material and the knowledge of how to apply it locally. In this way, how the roof is built is a function of the local environment and those who own it. There can be variations in the use of the single method, like those variations in the style and methods of thatching between different areas in the UK (Nash, J 1991). An array of materials used in roofing can be found in South East Asia where the choice of the appropriate material depends on the affluence of the owner. These will vary from the use of steel or asbestos sheets to the more expensive use of glazed roof tiles (Landaeta, G 1987). Today there is often a common use of flat roofs with tar felt for protection against rain. The use of flat roofs typically appears when the designer is not from the local environment and therefore his knowledge of local materials and methods is weak. The use of suitable materials and methods is found where the user and owner of the property control design and construction, and when they are derived from the local environment.

6.5 Technology as a Function of Control

The form of technology used in relation to the built environment can determine local control and self-reliance. Basically all infrastructure technology is centrally provided because of the complexity and size of technology used. In order for the user and owner

of a property to be able to maintain control and have the power to take appropriate decisions relating to his or her property, technologies should be small and enhance the individuals' ability to become more self-reliant. These qualities can be associated with a local community in the same way they can relate to an individual property owner. If an infrastructure technology is reduced in size and complexity it will enable its management locally, thereby enhancing local control and a transformation of knowledge. The form of technology becomes a function of local control. The following examples attempt to indicate how technology may or may not enhance local control.

6.5.1 Infrastructure Technology and their Management

Most infrastructures in the world are centrally provided. Any form of infrastructure is comprised of central units and a grid or network. These networks extend to the inside of any built form. The internal wiring of a home becomes part of the infrastructure network as a whole, in the sense that plumbing installations are to water and wastewater systems. The sophistication of central plants means that they can only be centrally managed. In a similar way the networks themselves, and their interconnectedness and relation to the central facilities mean that they also have to be centrally managed. In all they are very large and complex systems.

Within the constraints of current prevailing forms of infrastructure, management of this integral part of the built environment cannot be done locally. There are however emerging technologies that allow for a larger measure of local control and self-reliance. Alternative energies in their many forms have the ability to decentralise the production of energy. The treatment of wastewater and domestic waste locally to be later used as fertiliser and in irrigation is another example. And the use of wetlands, whether natural or artificial for providing water for consumption can also achieve this. Although these technologies are not common yet, supporting them will enhance local management as well as improve the environment.

6.5.2 The Autonomous House

There are many attempts at creating a dwelling unit that is self-contained and self-reliant in all its functions. This dwelling unit should be able to undergo a number of vital functions as best it can. It must generate its own energy requirements. It should be able to treat domestic waste generated in it. And it should be able to provide water suitable for consumption. Many attempts at this have been tried with varying degrees of success.

The provision of energy in particular has attracted much research on applying alternative energy sources. These include wind, solar, and gas among many. Solar collectors and photovoltaic cells are the most common small-scale solar energy providers (Vale, R 1975). They may either directly provide electrical energy, or as in the case of the solar collector, it can be used for heating water or the home in general. The use of wind energy is a good example; it needs a relatively larger area of property in order to apply a wind turbine successfully even when there is sufficient wind energy (Vale, R 1991). Gas can be used from a number of different sources. It can be used through the processing of animal and human waste on farms producing what is termed bio-gas, which can then be used domestically for cooking and heating purposes.

The treatment of household waste and sewage is another form of energy provision while at the same time having the ability to dispose of these wastes in an environmentally friendly way. Identification of the components of the waste is important to assess the method used to treat it and the amount of energy that can be produced by treating it. Providing water is a significant part of the autonomous house. The ability to make the house self-reliant from its demands on water rely heavily on its ability to recycle part of the water to be used again while using another source for consumption. All these initiatives work together to form the autonomous house and achieve decentralisation of control over the infrastructure and its management.

6.5.3 Bacteria Purification Plants

This is a form of water purification plant that does not have to be centrally provided and managed (Roseland, M 1992: 196). They are small in scale, although not to the extent of the individual house unit. They enable a small community to provide water needed for consumption, and therefore self-manage part of their infrastructure. This technology is not widespread yet, but it is environmentally friendly and does not produce dangerous by products. It depends on natural processes that take place in wetlands but developed on a far smaller scale. On the larger scale, artificial wetlands can be used to the same end. This method relies on the designation of a suitable piece of land to make this into reality.

6.6 Sustainability Outcomes

Sustainability may not seem to be directly linked to local control of knowledge or decentralisation of technology. However if the technologies that have developed as a result of local methods, they often show a high level of sensitivity to environmental factors. If built form translates the needs of its users well and if this done through increasing self-reliance, then local knowledge can enhance sustainability. In a similar way, because it is a locally controlled technology, it is more closely managed. Another outcome is enhancing community self-reliance, a sustainability goal in itself. Researchers should note that the use of indigenous knowledge is advocated by sustainability movements and their proponents, particular in the UN, who focus on poor communities and ways to help them. Outcomes of locally developed knowledge and technology toward sustainability are characterised by the use of environmentally sensitive methods and technologies.

6.7 The Local Environment System as Affected by the Control over Knowledge

Using of external methods and technology takes some control out of the hands of the local communities. This does not however prove that the use of new technologies is necessarily less socially beneficial that the continued application of traditional ones. One can however agree that if the decision on which type of technology is to be used is sound, and this technology is appreciative and compatible with local knowledge, the technology becomes as a resource that can sensibly improve the built environment. In this way the "systemness" of the local community can prevail. However the assignment of particular methods, without input of the people affected, causes inappropriate decision-making.

A transformation of knowledge in the way portrayed by structuralism systems thinking, can be identified in the way knowledge developed through time in traditional settings. In these traditional indigenous settings there is no distinction between design, construction, structure or materials where all are part of a single holistic entity. The process of its evolution will be disturbed if the transformation of the knowledge is no longer local and is centrally prescribed. This will not facilitate knowledge to develop towards achieving local needs but rather imposes a centrally defined model of local needs. It also distances the decision making process from its point of application and deflects definition of the goals from the local to the central. This is dangerous because it no longer leads to the satisfaction of local needs. With local needs in mind, the

environmental goals will be achieved, because any negative environmental effect locally will fall on the local community, and it is not in its benefit to make non-environmentally friendly decisions.

6.8 Indicators of Knowledge Control and Self-Reliance

This chapter assesses level of self-reliance and hence local control over the building process through the inherent local knowledge and technology. To do this it is necessary to identify the parties that are involved and whose knowledge makes a contribution to local control. The following are indicators identified throughout this chapter and which can be used to assess control and self-reliance in terms of knowledge and technology in the case study.

1- ***Parties That Transform Knowledge***: - They are the three basic parties mentioned at the start of this chapter; these are *designer, builder,* and *user*. Each can play a part in the transformation of knowledge concerned with building. These parties help to identify what knowledge is transformed;

2- ***Forms of Transformation of knowledge***, (*unified, dispersed, user defined design, and builder unified*) are formulated to analyse and model who defines what in the building process and the relationship between the different parties;

3- ***Size & Remoteness***: - are similar to the concept of size and remoteness in the parties that were mentioned in Chapter 4. However two forms of remoteness were identified; that of involvement in the building process and that of vicinity to the local environment. The smaller the size of the party the larger the ability to satisfy and focus on the needs of the user;

4- ***Use of Local Knowledge, Materials, and Labour***: - This is the fourth indicator of control. This parameter views knowledge, materials, and labour as a resource and demonstrating that the availability of the resource locally will further its local controllability;

5- ***Form of Local Technology***, This indicator refers to infrastructure technology in particular and the level to which technology can be provided and managed locally rather than centrally.

CHAPTER SEVEN
Case Study Methodology

Case Study Methodology

7.1 Foreword

This section onwards is dedicated to the case study applications. Its purpose is to test the theoretical framework proposed during the course of the previous chapters of the study. In doing so it is applied to two case studies in Cairo. One is of a traditional settlement form with a perceived high level of local control and cohesive local community as seen in 'Kerdasa'. The second, 'al-Asher', is a planned settlement form, designed and executed by the state to house a population that came together through the acquisition of residential property and who have a perceived weak level of local control, particularly over their built form.

This chapter determines the methodology of the case study. It compiles the control indicators introduced at the end of the discussion of each of the three functions of control in chapters 4-5-6. Sustainability indicators derived from its goals and objectives that are found in chapter 2 are added providing a method to assess the quality of the local environment with particular reference to built form. This chapter also defines how these indicators will be identified in the case study, whether through observation, survey questionnaire or archival data. The compiled indicators are discussed individually in chapter 9 after all data collected on the case studies is presented in chapter 8.

This methodology satisfies the primary objective of the research, which is to observe a concept of local control as proposed in the study and view how it affects the local environment system. At the same time it determines the ability of the population to form a local system, take decisions regarding their environment, and how to manage it.

7.2 Sustainability Indicators

The following group of sustainability indicators is primarily used to assess the quality of each of the two case studies. They are varied and diverse, making them to an extent a holistic evaluation method. These indicators are observed both in a general sense, and in how they are reflected in the urban form.

7.2.1 Social Indicators of Sustainability

Firstly the social goals that were identified earlier in chapter 2 (p:14) and how they are reflected in built form are presented in the following table:

Social Goals	Reflected Built Form Indicators
1- Equality for men / women and disabled.	Urban forms sensitive to the needs of women and disabled.
2- Equity between peoples	De-segregation between poor and affluent
3- Education and environmental awareness	Awareness of environmental problems related to the built environment.
4- Human rights	Ability for self-expression within the built environment.
5- Eradication of poverty	Provision of shelter.
6- Health	Provision of shelter & health facilities
7- Provision of Shelter	Provision of shelter.
8- Promoting the role of the family	Adequacy of shelter for the extended family
9- Promoting the role of the community	Existence of spaces for community interaction and meeting.
10- Political and civic rights and participation	Existence of spaces for community interaction, and integrated community facilities.
11- Promoting social and cultural values	Spaces for social interaction and practice of social and cultural functions/ identity in and distinctiveness in urban form.
12- Improving the quality of life	Quality of dwelling and urban forms for all.

Table 7. 1 Social Indicators of sustainability and their translation into built form.

7.2.2 Economic Indicators of Sustainability

The economic indicators of sustainability are often not directly reflected in the built environment. They can be reflected to some extent if we identify the needs of the economic activities that are most environmentally friendly. These needs are diverse, but differentiation can be made between needs of the small business and craft based activities and the large business, in that the latter can be taken up in smaller spaces and can more easily be distributed throughout the urban fabric. The contribution of either a small or large business to general economic indicators has already been discussed in Chapter 2 (p:20). The economic goals in their three major categories, which were identified and how they are reflected in built form are presented in the following table:

Economic Goals	Reflected Built Form Indicators
Strong Economic Performance	General observation of local economic performance
Sustainable Economic Activity or Industry	
1. Technologies appropriate to the desired ends	Obs. of technologies used locally.
2. Safe and environmentally friendly materials	Obs. of materials used in economic activity and in building.
3. Products that meet basic social needs and some individual wants	Obs.
4. Low and no-waste production processes	Obs.
5. Safe and Skill enhancing working conditions	Obs. Possibly through adoption of small business economic activity.
6. Energy efficiency	Obs „ „
7. Resource conservation to meet the needs of future generations	Obs
8. Level of pollution of the economic activity	Obs
Strong, Diverse, and Sustainable Economy and Economic Activity	
9. Community self-reliance	Local owned & controlled business.
10. Community control	„
11. Establishing community organisations	Obs
12. Sustainable employment	Obs
13. Sustenance of local economic strength	Obs
14. Establishing of local economic development plans and management	Obs

Table 7. 2 Economic indicators of sustainability. Obs: general observation

Some of these goals can be reflected in the built environment and some cannot. Small businesses are less liable to be pollutive but are more skill enhancing. In addition they can provide larger employment for local residents in that they are more labour intensive. The reflection of small business in built form may result from adopting mixed land use. Although a small business as an economic activity is not the only way to achieve economic indicators of sustainability, it is sometimes a goal in itself and often seen to fulfil more indicators than the large business. Whatever the type of activity, the built environment must accommodate the needs of the economic activity.

7.2.3 Environmental Indicators of Sustainability

Environmental indicators are observed in the level of pollution they can contribute to the three major media of pollution (Chapter 2 p.53), and can be observed in built form as follows:

Environmental Goals	Reflected Built Form Indicators
Air	
1. Heat Pollution	Reduce the need of the automobile
2. Particulate (dust and any solid particles)	Less pollusive economic activity
3. Oxides (e.g. carbon and sulphur dioxide ...)	Obs.
Water	
1. Sewage	Appropriate Sewage treatment & network
2. Industrial waste	Less pollusive economic activity
3. Heat	Obs.
Solid	
1. Household solid waste	Reducing unused solid waste/ recycling facilities provision in urban form.
2. Building waste	Reuse of building materials/ recycling
3. Industrial	Obs.

Table 7. 3 Indicators of sustainability and how they are identified in the built environmental. Obs: observation.

The research will not attempt to measure pollution within both case study settlements. It will however attempt to observe environmental indicators and identify if urban form encourages less or more pollution. People's perceived level of pollution in their settlement will provide an indication of the degree of pollution. The research will not attempt to measure environmental pollution in itself, and use it as an indicator. This is for two reasons. The first is that a large part of pollution is attributed to the availability of technologies that are supposed to reduce it. Another reason is that it is not the aim of the study to explore or examine environmental pollution as a measure of the quality of the environment on its own. Instead the aim is to identify the level of awareness within the community to environmental pollution, if there is a will and ability to combat it using means at hand and, more important, to identify how urban form may contribute to pollution or protect against it.

7.2.4 Indicators of Sustainable Urban Form

The following indicators are those directly associated with urban form. There are two groups that may overlap. The first are those urban form indicators as derived from the general goals and objectives of sustainability found in the three previous tables. The second group is that found in literature as discussed in Chapter 2. The following table presents specific urban form indicators found in the literature (Chapter 2 p.32) and their contribution to general sustainable goals and objectives.

Urban Form Indicator	Contribution To Sustainability Goals
1. Urban density	Reduction of need of transport & therefore care use
2. Mixed use forms	„ / more socially vibrant and safe env.
3. Alternative energy use	Reduction of care use
4. Community co-operation in managing the built environment	Community participation,
5. Establishing areas for social interaction and a larger number of spaces for it	Social cohesion & promoting well being of community
6. Street Calming, and if streets are more pedestrian friendly than car friendly	Reducing use of the car and increasing community areas
7. Architectural distinctiveness	Promoting cultural values and needs
8. Energy conservation in home	Reducing pollution & use of alternative energy
9. Improving quality of life	Physical qualities of the urban form

Table 7. 4 Indicators of sustainable form and their possible contribution to sustainable goals.

The following are the reflections of general sustainability goals found in the previous tables 7.1-7.3 and how they are identified in the case studies:

Sustainability Indicators	
1. Urban forms sensitive to needs of women and disabled	Obs
2. Desegregation between poor and affluent areas	Obs
3. Basic provision of shelter	Obs
4. Adequacy of shelter to house the nuclear family	✔
5. Existence of areas for community interaction	✔
6. Areas for community meetings like forums	✔
7. Areas for cultural functions	✔
8. Urban form suited to cultural needs of the locality in terms of identity and function	Obs
9. General quality of dwelling and urban form	✔
10. Small business structured in local built form	✔
11. Non pollusive economic activity structured in urban form	Obs
12. Reduction of the need for the automobile	✔
13. Appropriate sewage treatment and network facilities	✔
14. Reuse of building material and their recycling	✔

Table 7. 5 General Sustainable indicators as seen in urban form and how they are identified in the case study. ✔ =direct question Obs= observation

To those we can add those derived from literature (Chapter 2 p.32) and found in **Table 7.4** defining how they are identified in the case study:

Sustainability Indicators	
1- Urban density	Obs
2- Mixed use forms	✔ -Obs
3- Alternative energy use	Obs
4- Community co-operation in managing the built environment	✔
5- Establishing areas for social interaction	✔
6- Street Calming, and if streets are more pedestrian friendly than car friendly	✔
7- Architectural distinctiveness	Obs
8- Energy conservation in home	Obs

Table 7. 6 Indicators of sustainable urban form as identified in literature.
✔ =direct question Obs= observation.

7.3 Control Indicators

Indicators of community control were also identified in previous chapters. The following section provides a total list of all those indicators and whether they have been identified through a direct question in the survey, deduced through observation and on site calculations or both.

7.3.1 Indicators of Control Derived from the Local Order System Function

The following are the control indicators derived from the first function of control found in chapter 4. How they are identified in the case study follow:

Control Indicators	
1. Levels of control and decentralisation of localities	Obs
2. Prevalent forms of submission to be found in the settlement and percentages of each regarding the different elements of the urban environment.	✔ ded
3. Size and remoteness of parties	ded
4. Strength of the claims identified through law/local norms	✔ ded
5. Existence of norms governing local community	✔ ded
6. Ability of community to manage and manipulate infrastructure	✔
7. Deduction of control and responsibility in the different phases and identifying the forms of submission for each form.	✔ ded
8. Existence of co-operative control over common property and area and existence of decision making process	✔ ded

Table 7. 7 Indicators of control related to the order system and how they are identified in the case study.
✔ =direct question ded = deduced through observation and analysis Obs= oberved

7.3.2 Indictors of Control Derived from Economic Activity Function

The following are the control indicators derived from the second function of control found in Chapter 5. These indicators and how they are identified in the case study follow below.

A- General Economic Indicators

The following indicators have much resemblance to many sustainability indicators. But at the same time they act as indicators of control over the local economic activity. They are as follows:

General Control Indicator	
1. Diversity of the economic activity	✔ ded
2. Use of local resources	Obs
3. Economic profile	✔ ded
4. Use of local methods and knowledge	✔ ded
5. Size of local employment	✔ ded
6. Size of community based activity ownership	✔ ded

Table 7. 8 indicators relating to the overall local control over economic activity.
✔ =direct question ded = deduced through observation and analysis Obs = observed

B- Built Form Indicators of Economic Activity Function

The following are indicators of the second function of local control as related to built form. They are as follows:

Control Indicator	
1. Prevalent forms of submission of the built forms of the economic activities	✔
2. Size and remoteness of parties	✔ ded
3. Relating to the stages of control	✔ ded
4. Level of dominance of state controls	✔
5. Degrees of authority allocated to parties	✔ ded
6. Adherence to local norms governing economic activity	✔

Table 7. 9 indicators relating to the overall local control over economic activity.
✔ =direct question ded = deduced through observation and analysis Obs = observed

7.3.3 Control Indicators Derived from Knowledge and Technology Function

The following are the control indicators derived from the third function of control found in chapter 6. Indicators for the Knowledge and Technology function are as follows:

Control Indicator	
1. Identity of the parties that transform the knowledge and control	✔ ded
2. Size and remoteness of the parties	✔ ded
3. Identity of the parties	✔ ded
4. Use of local knowledge materials and labour	✔ ded
5. Existence of Local Methods	Obs
6. Forms of local technology	✔ ded

Table 7. 10 indicators relating to the overall local control over economic activity.
✔ =direct question ded = deduced through observation and analysis Obs = observed

7.4 Research Methodology

The objectives of the case study are to provide insight into the theoretical framework introduced and to test the hypothesis, in an attempt to explore ways and means that would promote a qualitative change in terms of local control. In order to do so it must satisfy the following:

1- Test the effect of the three functions of control (Order system, Economic Activity, and Knowledge & Technology) practically and see how they effect the environment in which they are in;
2- Observe the ability of the local environment to become a system having authority and responsibility to define its built form;
3- The third and most significant is to formulate the hypothetical relationship between sustainability indicators and control indicators as defined in the theoretical sections of the study (**Fig: 7.1**);
4- Explore a process which would induce and promote change that takes into account control parameters as a catalyst for attaining more sustainable local environment systems. This can be attained through analysis and examination of the outcomes.

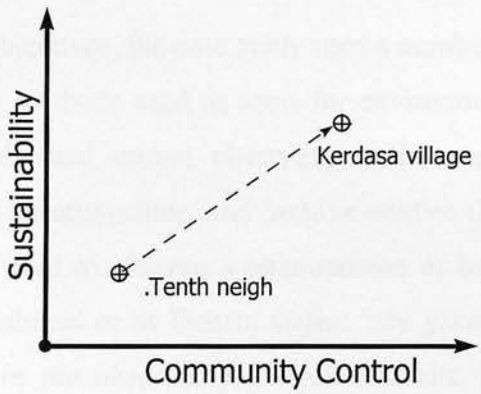


Fig: 7. 1 Hypothetical relationship between sustainability and control.

The third task is the main objective of the case studies, which is to chart a hypothetical relationship between control and sustainability. The hypothesis is that there is a directly proportionate relationship between sustainability and local control as defined in the study, sustainability being used as a method to assess the local environments whether in terms of built form or other non-built form indicators. This relationship will not necessarily be identified by comparing the total number of indicators that are satisfied in each of the two case studies, but by identifying the effects between different control indicators towards achieving various facets of sustainability. The choice of locations used for this comparative study was based on a perceived level of local control backed up by a reconnaissance study. The first location, al-Asher, is a state built and managed settlement. The second, Kerdasa Town, is an organic settlement that took a long time to

develop, and where there is a sense of community and an ability to manage and control much of its own environment.

7.4.1 The Reconnaissance Study

A reconnaissance study is conducted in order to identify the suitability of locations where a case study might be applied. It also helps to "pilot" the questionnaire and identify its suitability. This research did not have an extended reconnaissance study. A number of locations were examined before a choice was made. The reconnaissance study was confined to visitations and on site observation, while testing some of the survey questions informally. Some interviews were also made with people from both communities. In the end a choice was made about the two most suitable locations, identified as the Kerdasa and al-Asher settlements.

7.4.2 Data Gathering Techniques

To satisfy the research objectives, the case study uses a number of data collecting tools. Zeisel defines five basic methods used as tools for environmental behaviour research. These are: observing physical traces; observing environmental behaviour, focused interviews, standardised questionnaires, and archive studies (Zeisel, 1981). The larger the number of methods used to observe a phenomenon or behaviour the stronger the reliability on the data gathered or as Denzin states: "*the greater the triangulation, the greater the confidence in the observed findings*" (Denzin, 1978:34). The following methods were used in the case study applications.

7.4.2/1st Physical Trace

The data collection techniques used were varied due to the considerations mentioned in the last paragraph. Physical trace means to identify the effects of different behaviour by observing their physical effects. For example cultural behaviour will reflect itself in the form of the architecture. Physical trace is presented in the research in the form of photographs and comments derived from observation. They are necessary to gain an understanding of the realities that exist in each settlement and to be able to gain a stronger understanding of what is happening there. Some of the indicators introduced rely on physical trace observations to be examined, such as the use of local building methods and identifying them. Also, identifying the level of maintenance of the local environment in terms of cleanliness makes it necessary to use physical trace and observation. These enabled building and population densities to be derived.

7.4.2/2nd Archival Data

Archival data is used to find background information about the two locations. These can include subjects such as government policy, obtaining layouts and plans of the urban form and designs of the residential units, and other quantitative information. Archival data was not used extensively because it was thought better to focus on the current on site situation. At the same time the existent archival data concerning both case studies did not document the recent changes in the settlements. Also, because Kerdasa is not regulated by the state, there was not much data available in the public domain.

7.4.2/3rd Reconnaissance Interview

Interviews were conducted before the main survey took place. The aim of which was to gather more in-depth information that might not have been uncovered in the main survey. The preliminary interviews guided the form of the questionnaire to be conducted. In some cases both interview and questionnaire were conducted. After conducting the questionnaire, open-ended questions were sometimes added, if and when the interviewee had more time to offer and had more information by way of his status in the community. This was particularly helpful in Kerdasa because of the lack of archival data.

7.4.2/4th Questionnaire

The questionnaire was structured with the objective of identifying indicators of sustainability and control. Background information for both samples of interviewees were identified. The aim was to validate the responses of the questionnaire. There are two kinds of questions that can be included in any questionnaire, these are open-ended and closed. Each has its pros and cons. Closed-ended questions are important because they are easily quantifiable and more precise in that they give answers to precise questions. However, this also means that sometimes, when in need of in-depth answers to important questions, results may not be attained. Closed-ended questionnaires also assume that the correct answer has to be in the list of answers given, which is often not true. It was therefore found more appropriate that the questionnaire should contain questions of both kinds. In this way, both types of questions can confirm each other and further validate the findings. More over, open-ended questions were needed because these would help in soliciting local suggestions for improving the living environment. This would have been more difficult to achieve when relying only on closed-ended questions. The objectives of the questionnaire are therefore as follows:

1- Provide background information about the respondents and location being researched;
2- Examine those indicators that were developed in the theoretical part of the thesis;
3- Use open-ended questions to gain a deeper insight to issues and to validate closed-ended questions;
4- Find suggested solutions to local problems through local insight.

7.4.3 Sample of the Survey

The survey questionnaire was distributed to approximately 50 respondents in each location. The questionnaire sheet contained a large number of questions, both closed and open-ended. The questionnaire was not distributed to a larger number of respondents because it was thought better to gather a large amount of information from a fewer number of people than the opposite. In this way a broader and in-depth analysis can take place. The researcher personally conducted each session, for a number of reasons. One is that a respondent might be illiterate or might not be able to understand the questions. Second, if there was an interesting interviewee willing to spend a little more time, this could be achieved more easily. At the same time there is a degree of suspicion within the communities, in which case conducting the questionnaire personally was reassuring. It also meant that each question was properly understood and therefore better quality answers were obtained. Of course, this greater interaction between the interviewer and the respondent risks the possibility of leading the responses. This meant that the interviewer (the researcher) had to be more aware of not leading the answers.

7.5 The Closed / Open -ended Survey Questions

In order to achieve the main objective of examining the relationship between control and sustainability, the survey data and results will be presented individually before they are cross-analysed collectively. The closed-ended questions, which are dominant in terms of their number, are there to evaluate specific indicators. The objectives of the open-ended questions are three, the first of which is to back up the closed-ended ones in a way that does not influence the sample responses. The second is to provide an understanding of the values system of local respondents. The third is to find out ways and means to improve the local environment, which in conjunction with the understanding of local control, could be adopted to form a method to promote a change to the effect of achieving a more successful environment.

The closed-ended questions are classified into four main categories that feed into the indicators formulated earlier. The two main categories are dedicated exclusively to

sustainability and control indicators. The third is an assessment of the quality of local built form and local satisfaction with it. These contribute to sustainable goals by determining the contribution of the built form towards a quality of life of the local people. Quality of local urban form has a section dedicated to it in the questionnaire also because the study is of architectural and urban background. The fourth category assesses social qualities and community cohesion. These contribute to sustainability goals addressing communities. They also contribute to assessing the ability of the local community to form a system that can be responsible for its environment, hence local control (**Fig: 7.2**).

This methodology will be applied to the remainder of the research. Chapter 8 presents the data collected in its different forms. Each is presented individually in the order they were gathered. In Chapter 9, cross analysis of the indicators will be provided thereby concluding the findings of the case study applications.

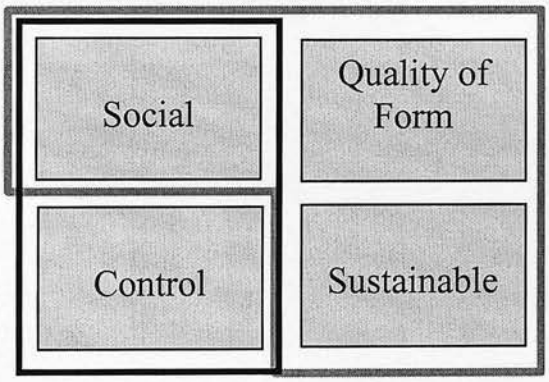


Fig: 7. 2 Indicators of the case study and their contribution to each other

CHAPTER EIGHT
Survey

8.1 Case Study Background

The data of the case studies is derived from questionnaires, archival materials, physical trace and interview. The first to be presented here is the background material that is derived from archival records and observations. The selected data is related to the settlement form, which is graphically presented. It consists of the plans of the residential buildings and the layout for both cases.

8.2 Location and Physical Form

8.2.1 Kerdasa

Kerdasa is a small town on the outskirts of Cairo but effectively has become part of Cairo because of the growth of the city (**Fig: 8.1**). It still maintains a small buffer of agricultural land; however large residential areas engulf it from every side. In a sense it has become part of Cairo, while at the same time it has maintained its own identity, which was developed through a long period of time. Therefore, it may be regarded as a satellite of Cairo, because of its geographic location on the outskirts of the city. The population of the village is 70 thousand. Originally its economic comprised farming and trading. Its role as a trading centre stems from a strategic geographical location being situated in the vicinity of several smaller villages. Trade consists mainly of farming produce, mostly fruits and also household goods. This takes place once a week in the 'Monday Market'. Anyone having home-made or other goods comes to trade, many of which are people from the neighbouring villages. These are the basic economic activities that Kerdasa traditionally relied upon. But with time this has changed to activities that are more related to its vicinity to Cairo and to the pyramids. For some time it has been renowned for the production of Egyptian garments which attract many tourists to the area who buy souvenirs and traditional and folkloric clothes. Its vicinity to the pyramids was a stimulus for specialisation of this activity. Lately, craft industries have evolved such as production of wooden doors and steel objects such as hand railings, windows and so on. Many of those involved in these crafts and trades also maintain regular employment in Cairo city centre.

The fact that this is an old settlement, which has evolved over a long time means that the formation of the urban pattern is organic, a physical character that dominates the

dense centre of the town. Urban growth today is still mainly organic because of an absence of state regulation. This is a reason why this settlement was chosen, because organic growth is a quality of local control over the formation of urban form (see Chapter 4).

8.2.2 al-Asher

The urban form of this settlement is a typical representation of a centrally planned, designed, self-contained housing scheme. It is part of "Nasr City" an extension of greater Cairo (**Fig: 8.1**). The Term '*al-Asher*' means *Tenth*[1], relating to it being the tenth region or subdivision of '*Nasr City*'. The creation of "Nasr City" was mainly to counter the housing problem in Greater Cairo. It is situated at the desert periphery of Cairo. The area was planned as a mixed development between state building low income subsidised housing and private development through the sale of plots of land (individuals and housing companies). Certain areas were designated for services and mixed use was not intended to occur. Many organisations and syndicates would acquire a number of land parcels to develop. Most of this was according to a master plan, but some companies had the ability to make changes to the layout. The army was one of those organisations that took up large part of land and developed it for their personnel. Nasr was never given a specific size outside which it could not expand, but was allowed to sprawl at will. Now with new developments that have come after its' original execution, it is no longer isolated from Cairo.

The "al-Asher" area is part of Nasr and occupies a large portion of its area. It is on the periphery of Nasr, being for a long time close to the bus terminal in the area. It has become more vibrant than it used to be. Many changes have taken place to the original plan of the area. This area in particular does not have much economic activity or employment. This is not the case, however of Nasr itself which maintains a strong business centre. Employment for many of its residents is located in Cairo Business District (C.B.D). The area of al-Asher is not planned to maintain any sort of economic activity. It is planned solely to solve a housing problem and, as such, its residents typically have to rely heavily on daily commuting to work from Cairo or Nasr business districts.

[1] The term *Tenth* is used to relate to al-Asher in the bar charts that are to follow.

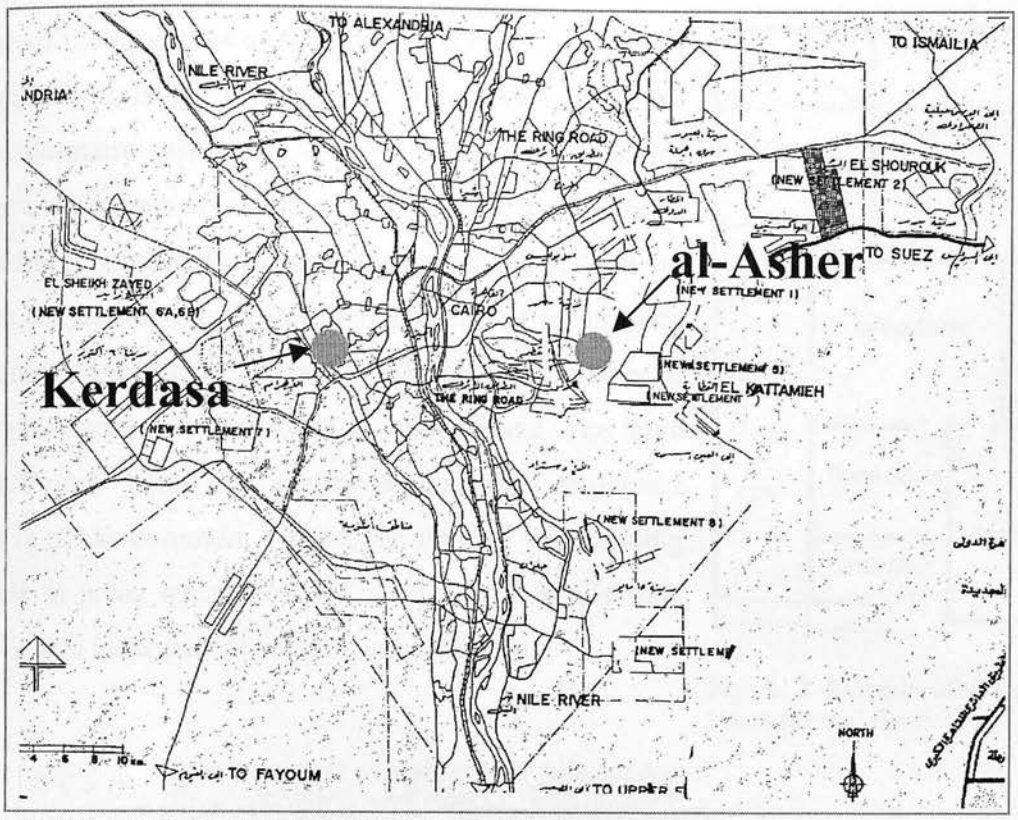


Fig: 8. 1 Greater Cairo / Location of al-Asher and Kerdasa

The master plan of the areas shows that streets are wide so that future congestion, a common problem in Cairo, may be avoided. This benefit will register when the area can be inhabited to its full capacity. At present, the width of the streets causes problems with regard to safety, exacerbated by poor lighting.

8.3 Dwelling and Urban Form

8.3.1 Kerdasa

The traditional Kerdasa house is typical of those found in hot climates. Generally, it possesses an internal court, whether it is a dominant feature in terms of size or merely a small patio inside the dwelling providing cross ventilation. Another significant feature is that the house can be made larger to accommodate the extended family. This is another reason for the existence of the court, which is to serve as a common place for all in order to socialise. In the morning this area serves as a place for the household shores with the wife of the head of the family supervising. The ability of the house to be extended enables the tradition of married sons to include their families in the home.

One of the examples of such homes is that illustrated in **Fig: 8.2**. It is the layout of the house of one of the questionnaire respondents. Designation of an area for rent in the form of a shop or workshop at the facade of the home is also a common feature in the settlement. The reason for this is that it is considered as an extra source of income for the family. The size and number of shops depends on the size of the plot of land. The large courthouse[1] home can also be found in the settlement but is not as common. The second floor of this building leads to areas where new members of the family may live, with independent kitchen and bathroom.

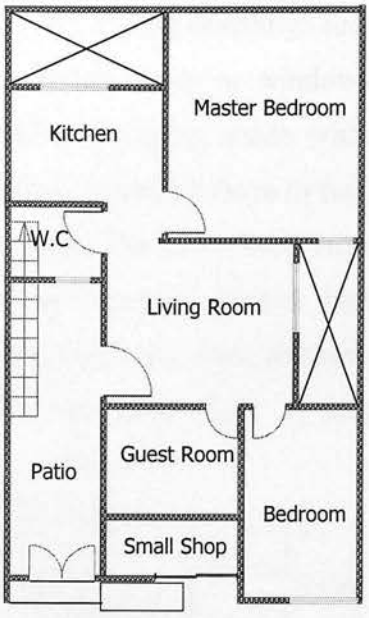


Fig: 8. 2 Example of a Kerdasa House (ground floor).

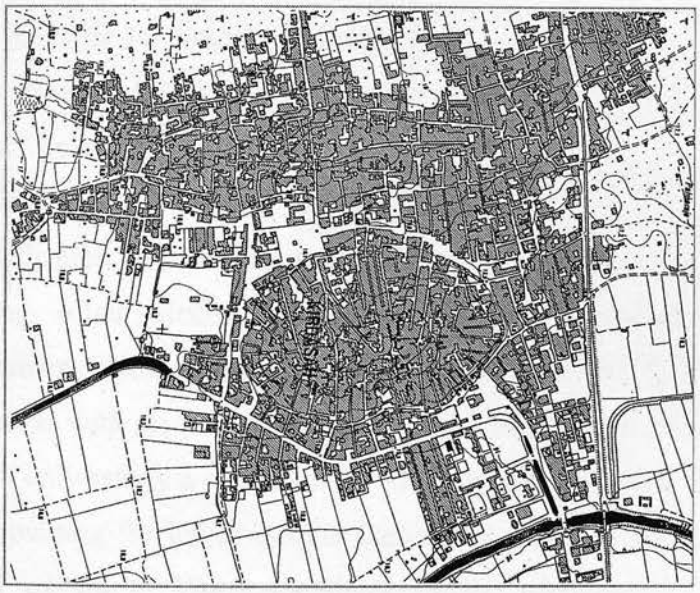


Fig: 8. 3 Settlement form in Kerdasa

Another common feature in most dwellings is the existence of a mastaba on the entrance of the dwelling. This is a brick and mortar sitting area where the head of the family sits and meets people. It is an old cultural icon of many Arab areas. From it the head of the family can observe the goings on in the neighbourhood and this is where disputes are often settled. It serves another cultural function as the place where different elders and heads of family congregate, particularly at times of the day when men are not welcome inside the home because women are then undertaking their household activities, thus maintaining the cultural norm of privacy.

[1] See chapter 6, Fig: 6.5.

The Kerdasa example demonstrates other features of Muslim traditional dwellings such as the prohibition of openings adjacent to each other[1], whether doors or windows. Similar to other organic forms in Egypt, streets are narrow providing shade while protecting pedestrians from the strong rays of the sun. Buildings resemble those in rural areas elsewhere in Egypt in methods and articulation of the form. The use of corn vines as an insulating material on roofs is very common. Land parcels parallel land subdivisions made for irrigation purposes. This demonstrates how local form followed the natural and physical characteristics of its surroundings (**Fig: 8.3**). It also demonstrates a variety of spatial distributions and diversity in urban form.

8.3.2 al-Asher

In al-Asher, apartments are identical. The principal goal for building them was to make low cost housing for young families. This meant that the floor area of each apartment had to be minimised to reduce cost.

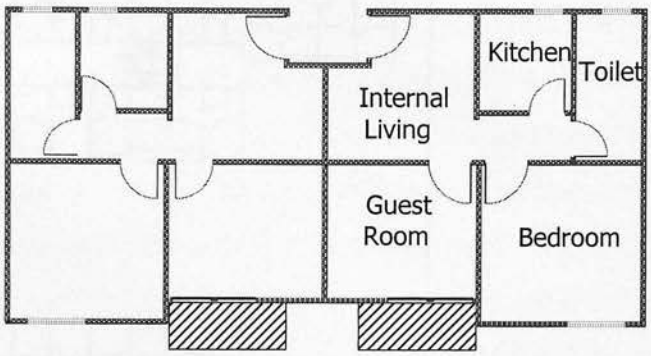


Fig: 8. 4 al-Asher apartments (living quarters of most interviewees).

Modification of dwellings only came about after a period of time through buying and selling, often joined adjacent apartments. This meant that the internal layout of apartments changed and larger units could be formed. This acquisition of adjacent units occurred with an increase of family income. As seen in **Fig: 8.4** the size of the unit could only satisfy a small family. Although this fulfils the original objective of building, in providing for lower income families, it does not accommodate any increase in the need of space. The respondents of the questionnaire often commented on this characteristic to be problematic.

Construction quality and finishing also seemed to be a common problem of the buildings, as indicated in responses in the questionnaire (see below). Many corners were cut in order to achieve housing with minimal costs. In addition, it was often suggested that contractors did not adhere to building standards and that all residents, after settling in, had to change much or all of the internal electrical wiring, plumbing, and finishing. Shortage of floor area led to the creation of illegal expansion of the areas of some apartments into adjacent free areas in order to satisfy a growing demand; a situation that

[1] See chapter 4.

was later legalised by the authorities in response to resident dissatisfaction of the original design shortcomings.

The settlement form is monotonous and repetitive in the way the buildings are spatially distributed. There are few variations since there is only one type that is used. This may have been another way to reduce cost through cutting designer and consultant fees.

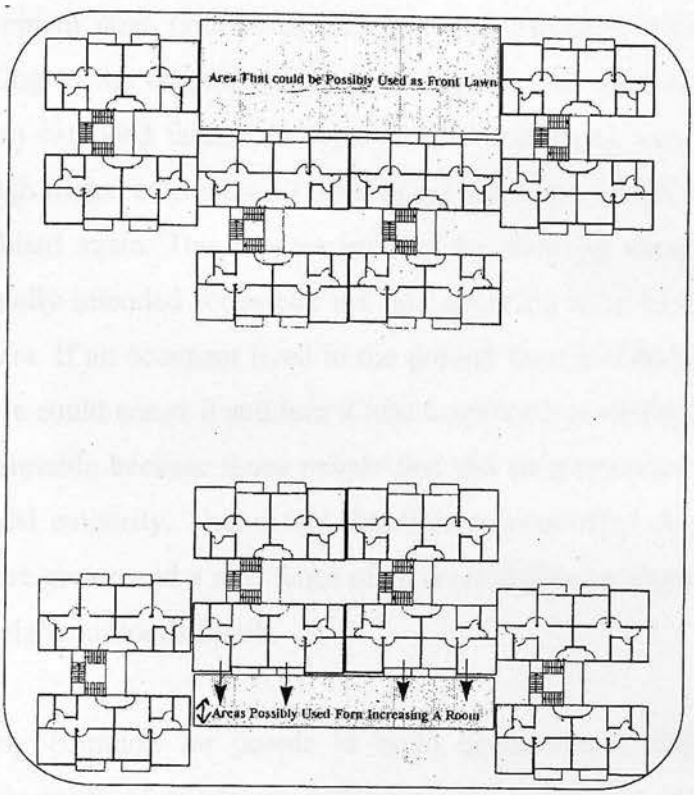


Fig: 8. 5 Typical Residential Block in al-Asher.

8.4 Growth of the Urban Form

8.4.1 Kerdasa

The growth of Kerdasa proves to be flexible, as seen in the organic growth of its urban pattern. This is important because it allows the urban form to adapt both to the needs of residents and to its environment. The urban pattern is not the only indicator of organic form. The house form itself shows a greater ability for accommodating change through time by allowing for future expansion of the extended family, often housing more than one family. Thus the design anticipates future needs of the family, rooting it for generations in the same place. Expansions in dwelling form are possible both vertically and horizontally, depending on the physical characteristics of the plot and the structural system used in the building. This flexibility does not inhibit the design from taking into

account environmental factors through the provision of an inner court. In all, form is adaptable to its environment.

8.4.2 al-Asher

The growth of al-Asher is quite different from the organic growth of Kerdasa. As a large planned housing development, the growth of the urban form came into existence, the result of phases restricted to the set location, i.e. a multiplicity in number which does not affect settlement size. Growth in terms of the individual dwelling unit is non-existent according to the original design intentions by not allowing for expansion to accommodate an extended family. In spite of this, extensions were often made. This happened through illegal extensions to the original buildings, which were later legalised and then prohibited again. This process initiated by claiming vacant land adjacent to buildings originally intended for public use and annexing them to the property of the apartment owners. If an occupant lived in the ground floor and had an area in front of his apartment, he could annex it and turn it into a private front lawn. Such cases proved to be more acceptable because those people that did so maintained these areas better than did the local authority. That meant that there was no litter or garbage piled into them, plants were grown and a nice fence often erected thereby improving the aesthetic quality of the neighbourhoods for all.

It was relatively common for people to build extensions to their apartments co-operatively. A number of apartment owners would collaborate together to erect an extending structure. This would enable them to benefit from new floor areas created by extending their apartments each at their own level. This scenario was permitted for some time because there was an acknowledgement by the state that apartment areas were not adequate. Later this permission was revoked following the Cairo earthquake of 1994 which cast into doubt the structural safety of the new extensions. But many of these extensions still remain and some continue to be made illegally. This realised an extra room for the apartment owners making it a valuable asset.

8.5 Background information of the Samples

The importance of providing the background information to the case study is that it provides essential knowledge about the respondents and their immediate built form. This allows for greater understanding of study samples and can also provide important links of information that may identify reasons for satisfaction, as attributed to a particular age group for example.

8.5.1 Occupation

The occupations of the respondents of each of the two locations are basically different. Kerdasa, originally a farming village that has changed with time, has occupations generally linked with agriculture and the trade of agricultural produce. However farming in itself does not constitute the major occupation that the population relies on. Most families own some agricultural land, but it does not provide the main source of income. The occupation profile in Kerdasa is dominated by different forms of self-employment. This sort of employment is often combined with civil service work as a source of fixed income. The dominant stated employment of the Kerdasa sample is: 19% small business owners; 11% manual workers; and 11% teachers (**Fig: 8.6**).

Occupation in al-Asher on the other hand seems to be predominantly in the civil service, as well as there being a large number of professionals. In al-Asher, 29% are civil servants and 17% professionals. Small business owners also are significant in number, but many of them do not have their businesses in the same area. Army officers and private clerical employees are also considerable in number (**Fig: 8.6**).

The number of students has not been mentioned despite its significance. In the case of Kerdasa, 28% of the interviewees were students. At the same time most of those that were questioned said they maintained some sort of private work, such as a family business, in parallel with their study. This demonstrated that an individual may be engaged in more than one activity, but their response depends on the perception of their occupation. In al-Asher this situation did not occur because being students did not mean that they had some sort of employment. Meanwhile, in the case of teachers and clerical employees in Kerdasa, they usually had another (casual) job. The large number of students apparently reflects the community's keenness in learning while working.

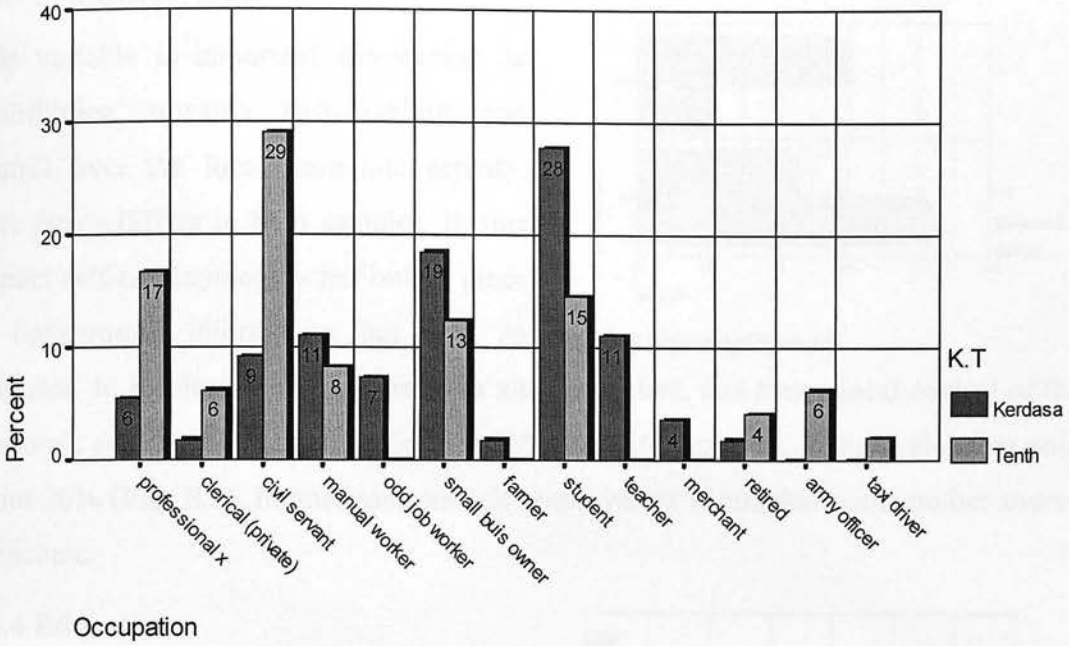


Fig: 8. 6 Bar Chart of Occupation of The Sample.

8.5.2 Age

The ages of the interviewees in both samples are very similar. The similarity of the ages of the interviewees goes well in harmonising the samples. At the same time the diversity of the ages of the interviewees meant a larger spectrum of individuals. This also meant that it was possible to take the views of the population regardless of the biases of their ages. In other words the satisfaction and perception can be measured within different age groups and therefore the average frequencies can be more representative of the population of the sample (**Fig: 8.7**).

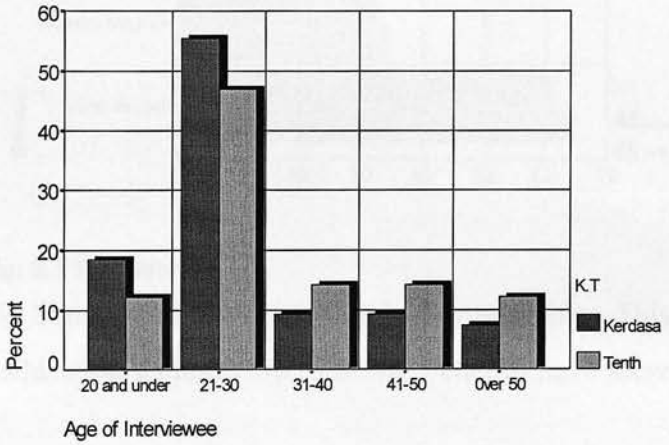


Fig: 8. 7 Bar Chart of Age of Interviewees.

8.5.3 Self-employment

This variable is important considering its contribution towards sustainability and control over the local economic activity. This factor differs in both samples. In this respect self-employment is not only a piece of background information but also an indicator. In Kerdasa self-employment is more prevalent, and hence local control of the economic activity is stronger. In Kerdasa 60% are self-employed, while in al-Asher only about 20% (**Fig: 8.8**). In both samples self-employment is coupled with another source of income.

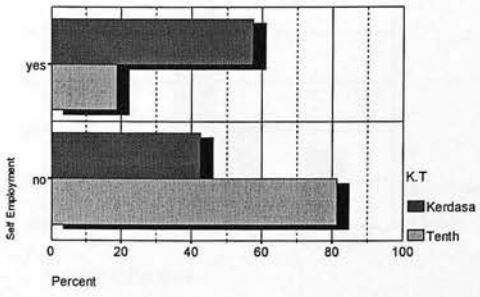


Fig: 8. 8 Self-employment

8.5.4 Education

The education levels in both samples seem to be very similar with a slight increase in al-Asher in the education of its' interviewees. This is another factor that harmonises the survey samples together with age. As can be seen in **Fig: 8.9** the dominant interviewee in both cases has experienced higher education. This is because in a large questionnaire which has an interview, it serves better to have more educated people.

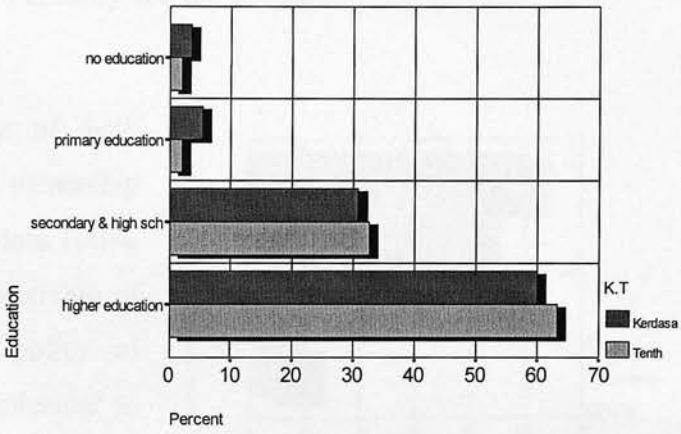


Fig: 8. 9 Education

8.5.5 Size Of Household / Number of Families

The size of the household in each dwelling and the number of families that occupy them differ significantly in both samples. In Kerdasa almost 40% of the households have 8 or more occupants in them, with 6 or 7 occupants also being common. In al-Asher the average seems to be 4 or 5. Although apartments in al-Asher are not intended to accommodate large families, lack of finances by occupiers means they are often over crowded when the family expands (**Fig: 8.4**). The number of families is an

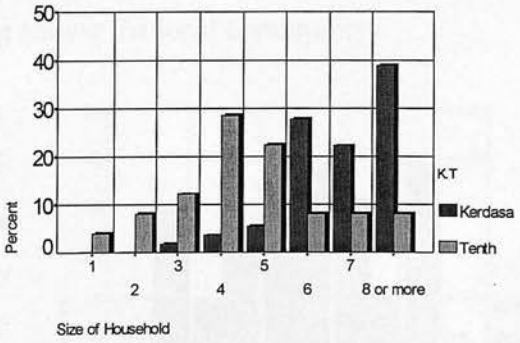


Fig: 8. 10 Size of household

indicator towards occupancy of the dwelling. More importantly, it indicates the degree at which the nuclear family can be found in each settlement. This is an important cultural and qualitative factor because it is still in the Egyptian culture to have close contact with one's family and live as close to them as possible. In Kerdasa 40% of the sample lived in households with two families and another 30% in households with 3 families. In al-Asher more than 90% were single family households (**Fig: 8.5**). Both samples are very different and give a good idea of the lifestyle in each area. These changes are induced by necessity and not choice.

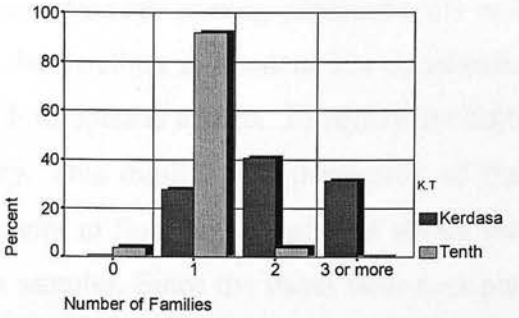


Fig: 8. 11 Number Of Families

8.5.6 Home / Land Ownership

The ownership of the property of both samples is relatively similar. While ownership of the land and the home is in Kerdasa 100%, in al-Asher there is about 80% ownership of the home (**Fig: 8.10**). A state policy of ownership in al-Asher had been intended to give families more security. This changed with time where some that had the capability to relocate, rented out their apartments (20%). Observing land ownership it is important to bear in mind that legally the land on which the apartment blocks are built in al-Asher is state owned. It is a completely different situation in Kerdasa. It is noteworthy that parts of Kerdasa that contained rented apartments, was considered a source of disturbance because of having outsiders living among the local community.

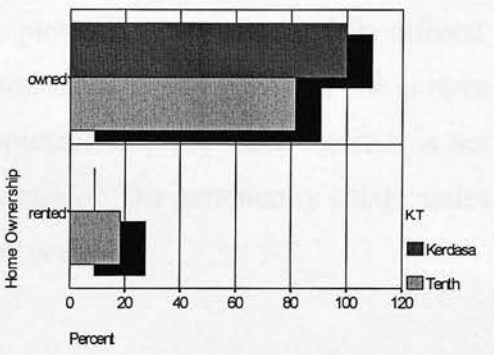


Fig: 8. 12 Home Ownership

8.5.7 Dwelling Area / Plot Area (Kerdasa)

Home areas differ in both samples. In al-Ashers these are uniform according to the design originally laid down. This is very different to that of Kerdasa where the built area depends more on the area of land available, finances available to build with, and number of people to occupy the dwelling.

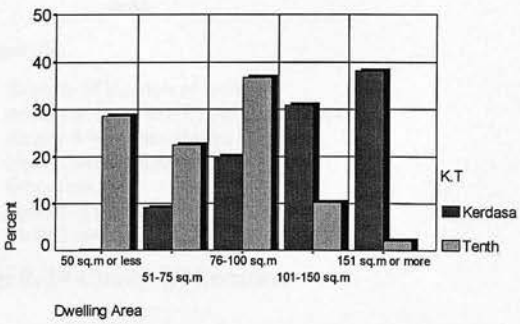


Fig: 8. 13 Dwelling Area

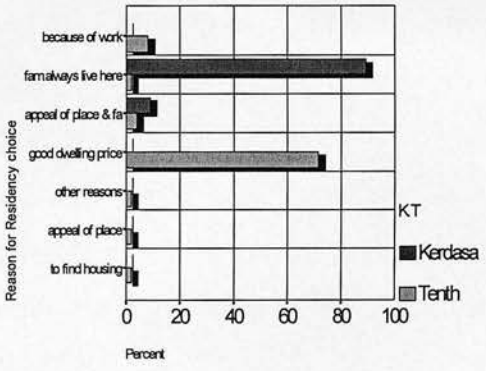
However, area expansions take place in al-Asher through joining adjacent units and making building extensions. At the same time the dwelling in Kerdasa has no specific floor area. Average floor area per person in both samples is approx. 21 sq.m/p for both samples therefore indicating similar occupancy. This implies that perception of the quality of built form was not biased by differences in floor area. **Fig: 8.13** shows the percentage of dwelling area in each of the two samples. Since the mean floor area per person is similar (because of the larger household in Kerdasa), It can be noted that the built form in Kerdasa is more responsive to large families living together. More important is that built form has the capability to change according to the needs of the family, i.e. the built form expands with the growth of the family. This is supportive to the definition of organic natural built form because, as the individual and family grows so does the dwelling in which they live.

In terms of plot area, the average in Kerdasa is 175 sq.m. This variable does not apply to al-Asher because land is government owned. The plot area is not always fully utilised. This is either because left over area can be later used as the family grows, or left as open green space adjacent to the property. This is important, because since Kerdasa is not planned, therefore green areas are not allocated centrally. The community compensates for this by providing it as part of the property when possible.

8.5.8 Choice of Living In Settlement

Q: *Why do you choose to live here?*

This variable is intended to explore why the sample chose to live in each of the two locations. It is a qualitative variable. The responses were taken from the respondents themselves at the start and were found to be very similar and limited. Responses seemed to be polarised around one reason in each of the two locations. In Kerdasa it was because it was the place where the family had always lived and it was a place that people did not want to leave (90%). In the case of al-Asher the reason was because of the price of the dwelling at the time of purchase (70%), while 5% claimed the reason was because of the



Responses:

1- Because of location of work
2- Appeal of place and family and friends
3- Family lives & has always lived here
4- Good dwelling price
5- Other reasons
6- Appeal of place
7- To find housing

Fig: 8. 14 Choice Of Location

location in relation to work (**Fig: 8.14**). This indicates that those people who had purchased the apartments from the original owners and came to the area did so because they had an employment opportunity nearby. However this number is too small to build derive from it any strong assumptions.

8.5.9 Building Density

Although the built forms for both areas are very different, building densities were found to be similar. In the case of al-Asher, calculating building density is straightforward, while in Kerdasa an approximate calculation had to be made. The calculation for al-Asher is made by taking the area of the residential block (**Fig: 8.5**) and adding to it half the area of the surrounding streets. Then the total area is found and is divided by the total floor space of the residential block (incl. half the are of the surrounding streets). This was found to be in al-Asher sample to be **1.52**. In the case of Kerdasa this was calculated by finding the average floor space of a Kerdasa home, and dividing it by the area of the ground floor including half surrounding street areas. In this case the density was found to be **1.63**.

8.5.10 Population Density

This is meant to measure the share of each individual to floor area. It is important to note that the current situation found in al-Asher differs from the planned one. Firstly these apartments were intended for newly formed families with no children, which is no longer the case. Secondly, floor areas have changed due to extensions made to the units. Therefore floor areas and number of individuals have changed from those originally planned. In the case of al-Asher, the average floor space per individual is **13.33 sq.m**. In the case of Kerdasa where an average is calculated based on the average floor space of the dwelling, the floor space per person is **15 sq.m**. Both these figures are based on the average number of people in the dwelling found earlier in this chapter: 4.5 in the case of al-Asher; sample and 8 in the case of the Kerdasa sample. Although floor area per individual is similar, the Kerdasa form allows for growth.

8.6 Perceptions of Dwelling Quality

The following variables are measurements of residents' perceptions and preferences regarding their dwellings. The questions asked are presented as well as the results. Statistical tests were performed on these variables. The following variables were deduced after asking the respondents to evaluate their homes in certain aspects on a five

stage scale from 0-100% (questionnaire in appendix). Chi-square is the major statistical test used on the results. The variables and findings follow:-

8.6.1 Air Ventilation

The result of testing this variable was that there was not strong statistical significance. This in itself is a result that indicates that the perception of both samples of their dwelling in terms of quality of air ventilation is similar, although the mean result for Kerdasa is slightly higher (**Fig: 8.15**). On observing the al-Asher apartment blocks we notice that each apartment may have window openings in three of the four façades. This means that through ventilation is good in all apartments. The fact that buildings have large distances between each other is another important factor. In the case of Kerdasa the situation is very different. Houses there can have openings only on two facades, but this is compensated for by the presence of internal courts, which act as a means of fostering air movement not only across the rooms but upwards. At the same time houses are adjacent to each other and generally much more condensed. This means that airflow through the urban pattern is more restricted.

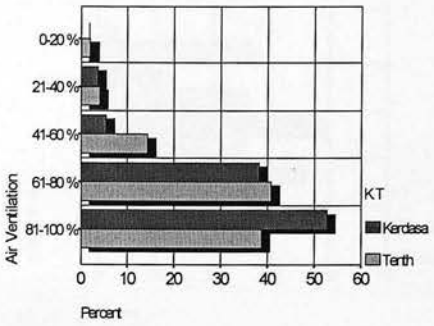


Fig: 8. 15 Air ventilation

8.6.2 Summer Heat

This variable, the previous and the following are strongly related to each other. Ventilation will affect the level of heat in the house whether this is in summer or winter. The statistical test indicates that the results of this question are significant. There is therefore a significant difference between residents regarding their satisfaction perception of the effect of heat in their dwellings in both samples. It must be remembered that a higher value means higher satisfaction. Results show (**Fig: 8.16**) that people are more satisfied in the Kerdasa sample in terms of summer heat affecting their home. This result can be attributed to the existence of the internal court found in the homes in Kerdasa, not found in al-Asher. This can also be attributed to the fact that there was a larger number of facades exposed to the sun that could lead to overheating of external walls, as found in al-Asher. This is heightened because of the presence of large distances between buildings in comparison to the

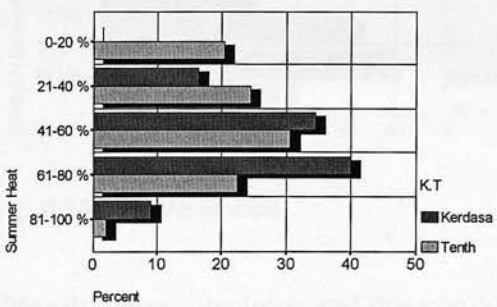


Fig: 8. 16 Summer Heat

houses in Kerdasa which are more compacted together tending therefore to shade each other throughout the day.

8.6.3 Winter Cold

Perception about feeling cold in winter is also affected by the ventilation inside the dwelling because of the effect of air currents on the temperature. The statistical test showed significant difference between the samples. This means that the perception of the performance of their dwellings in terms of preventing cold in winter differed (**Fig: 8.17**). The bar chart demonstrates that a significantly larger number of residents thought that their dwelling performed better in Kerdasa. This may be attributed to the compactness of the urban form which may discourage strong air currents from flowing freely, compared to the large distances between buildings and open spaces as found in al-Asher.

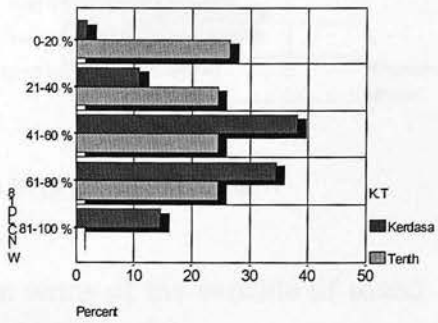


Fig: 8. 17 Winter Cold

8.6.4 Light Penetration

Light penetration in both samples showed a significant statistical difference between the two samples. **Fig:8.18** shows the differences between the perception of satisfaction in both samples in terms of light penetration, higher satisfaction being found in Kerdasa. Again this can be explained by the existence of the court. This does not seem too obvious because in al-Asher, apartments are oriented in three different directions and this would imply good light penetration and distribution. The reason for this is the size of the windows that are relatively small, possibly originally intended to reduce the cost of the apartment.

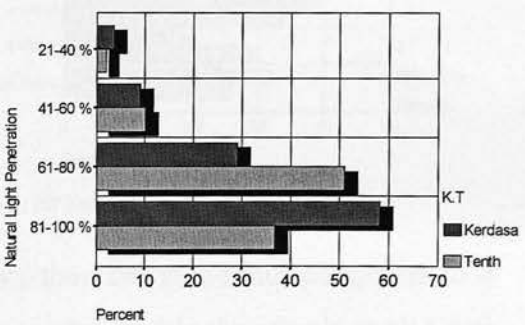


Fig: 8. 18 Light Penetration

8.6.5 Sound Insulation

Perception of sound insulation satisfaction was not statistically significant. Samples showed similar means of 56 in Kerdasa and 47 in al-Asher. **Fig: 8.19** shows significant difference in responses in both samples, but these differences even out over the full population of the samples. The mean results in both are close to the 50% mark, meaning a weak satisfaction level. Similarity in terms of the variable of sound insulation exists although urban patterns and forms differ considerably. The al-Asher sample does not show a normal distribution in frequency results, which suggests that a particular group of people suffered from noise more than others, possibly as a result of living near the ground floor.

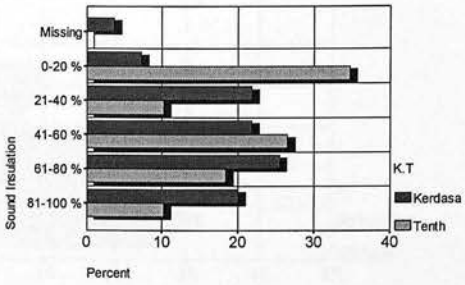


Fig: 8. 19 Sound Insulation

8.6.6 Spatial Distribution

Spatial distribution variable did not show a significant statistical difference. This is an important outcome. It demonstrates that the professional design and planning of the built form did not improve the populations perception of their satisfaction towards the quality of spatial distribution. Kerdasa residents' instincts on shaping urban form prove they are successful compared to a professionally shaped built form in al-Asher. The result found in the sample in al-Asher could be biased by an insufficiency in area of the apartments. Floor plans do not seem to suggest any obvious flaws in design, which re-enforces the previous suggestion. It can also be suggested that in Kerdasa, because design was initiated by the owner therefore it respects his needs or indeed the opposite argument that one does not see flaws in what he has made. Looking at plans of Kerdasa, although problems in design may sometimes occur, each dwelling respects the needs of the owner and community. This is because the home grows gradually with the growth of the needs of the household, which means that when the owner needs a new room or a storage area he designates the appropriate place and builds the new facility.

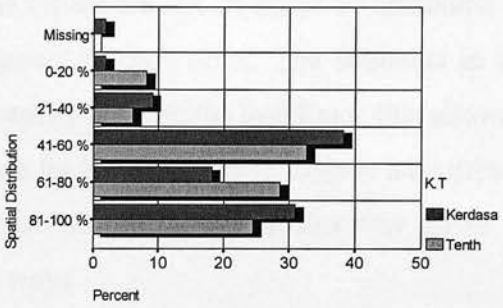


Fig: 8. 20 Spatial distribution

8.6.7 Privacy

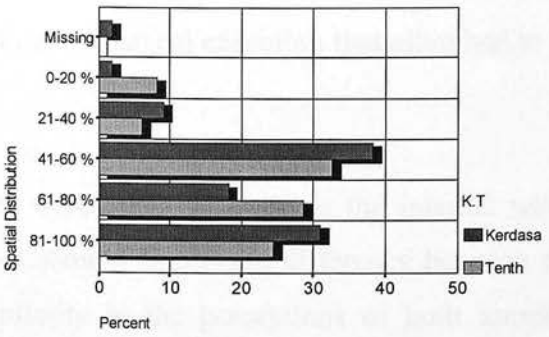


Fig: 8. 21 Privacy

Privacy is a strong Egyptian cultural norm. This variable did not show statistical significance. This is an unexpected result, because the courtyard house used in Kerdasa is known for its quality of providing privacy. This is an important variable to both samples, although it might be more significant to residents of Kerdasa because it is a small agricultural community. Possibly in al-Asher there is no problem with privacy because socialising takes place in coffee shops or formal occasions. The Kerdasa house seems to respect privacy because of its larger floor space. The frequency distribution of Kerdasa concerning privacy does not seem to be a normal distribution (**Fig: 8.21**). This indicates that some groups are satisfied with the privacy of their homes while others are not. It could be attributed to the size of dwelling or because buildings adjacent to each other. The residents in al-Asher noted that, because there were large distances between the buildings, this allowed for a higher level of privacy. This is not the case for Kerdasa, where there is a courtyard and where openings are introspective rather than on the façade. In this way forms in each settlement can satisfy privacy in different ways.

8.6.8 Internal Sanitation System

This variable is intended to measure satisfaction with the quality of the internal sanitation system[1] within the dwelling. This variable showed statistical significance using the Mann-Whitney test used for those variables on a scale of 1-10. The sample populations were asked to evaluate the internal sanitation system on a scale of ten. The mean for the perception of people living in Kerdasa for internal sanitation is 86%, and that in al-Asher is 62% (evaluation of 1-10 was converted to a percentage). In examining these results, it must be remembered that the method used in supplying internal sanitation deffers. In the case of al-Asher this was done through general contractors who are supposed to adhere to the building standards and under state supervision. In Kerdasa this was done through the efforts while supervision of the owner through private contracting. The owner and occupier is motivated to provide better

[1] Here Sanitation is intended to mean internal water supply pipes and waste water pipes in addition to their appliances such as showers and so on.

technical quality because it will directly affect him. This did not occur in the other sample where there was often complaint of poor technical execution that often had to be redone by owners.

Similar to internal sanitation, the samples were asked to evaluate the internal water system. In this case statistical tests did not show a significant difference between the two samples. That means there is a similarity in the perceptions of both samples regarding the internal water pipes and appliances. Despite that, the test does not show significance of the results. The mean in al-Asher is slightly higher than that in Kerdasa at a mean of 77%. The reason for a higher satisfaction in Kerdasa in terms of sanitation, in comparison to water system, is because in some places authorities still have not made available clean running water where often people depend on wells. This may affect their perception of satisfaction towards the whole system. The population of al-Asher does not suffer from this problem, but those are complaints about the quality of the physical execution.

8.6.9 Internal Electrical Supply System

This variable did not show a significant statistical difference between the two samples surveyed. Satisfaction in both cases is about 85% which means residents are more than satisfied. It is sometimes true that residents will not be satisfied with their facilities and may not have the finance to improve their facilities. It is true that often residents in al-Asher changed their internal electrical supply and wiring system, mirroring to the water and sanitation systems because of bad quality in initial installation. This suggests that this and the previous two variables indicate that the state was not able to provide satisfactory internal technical infrastructure system.

8.6.10 Internal Finishing

Results for sample perception of the internal finishing of their dwellings did not show a significant statistical difference. This indicates that resident management and supervision over the building process show similar satisfaction levels to that managed and supervised by professionals with regard to internal finishing. In this case the mean perception of the quality of the internal finishing was about 65% in both cases, indicating that samples are relatively satisfied. Higher satisfaction was not achieved probably because they are not affluent and aspire to better quality. This is particularly represented in the quarterly of doors, windows or flooring that they may have.

8.6.11 Structural Quality

This variable represents people to perception of the quality of their structure system. It is important in that it shows satisfaction with a variable that needs a relatively high level of technical knowledge. Safety of the structure and those who live in it depends on proper standards of execution. In Kerdasa, structural execution (the building process) is undergone with relatively little technical help through the knowledge of local builders and supervision by property owners. Structural methods in Kerdasa are originally through the use of mud because of the agricultural background of the area. This changed with time and with contact as the community started to experiment with new methods, although the use of mud brick is still in some cases practical today. The more dominantly used structural system is the wall bearing system, since most property owners do not need to have in excess of 3 floors. The Use of reinforced concrete enabled the community to increase the number of floors and make the building more durable with time which was not the case with the use of wood roofs and floors. A reinforced concrete frame (skeleton system) is also sometimes used in the area, but it is not the dominant method. It is used more in the central more expensive parts of the settlement where maximum utilisation of the land is needed. Local small contractors make the reinforced concrete structures. These contractors have little technical background and rely mainly on experience that they use to assess the needs of the building in terms of steel, plain concrete, sand and water. This demonstrates the ability of the local community to adapt to new methods of construction and to use them effectively, thus controlling them. A bond of trust exists between the small contractor and the homeowner because they are both part of the same community. Often members of the family of the owner of the property will help in work during the building process, therefore cutting costs. All this roots new methods in the community, providing some local employment.

In the case of al-Asher owners received the apartments, and had nothing to do in the management of building their structure. This variable did not show statistical significance, which indicates that perception of the quality of the structure did not suffer as a result of self-management and lack of regulations found in Kerdasa. There is very little government authority over the organic building process there. This is confirmed by the onsite visits to the area, which showed that people did not try to cut corners that may affect their safety and would be more generous when spending on the structure than

anything else did. The mean is about 78% for both samples, which indicates a high level of satisfaction with structural quality.

8.6.12 Home Appearance / Home Identity

The appearance of the home is a variable directed towards evaluating the overall appearance of homes, in terms of design and use of materials satisfying residents aesthetically. There was no statistical significance in this variable. Dwellings in Kerdasa are more articulate and diverse in character than al-Asher, although many of them have poor finishing, hence reducing satisfaction to their appearance. While al-Asher outside finishing to buildings are executed to standards, they are very monotonous. Technical quality of finishing induced the sample to give a satisfactory rating. In Kerdasa some dwellings are very articulate and elaborate because the affluence of the family living in it. The mean rating for the perception of the sample towards appearance is higher in Kerdasa at 67% to 57% in al-Asher.

People's perception of their home identity is related to their perception of the quality of its appearance. The variable for home identity only applies to the Kerdasa sample because of the greater role of owners in selecting materials and form, while in al-Asher identity is virtually non-existent because of the repetition of the design model. The residential block in al-Asher is a very simple and straightforward block, with very little articulation in terms of design. Identity is found in the relationship of the apartment block to services or shops, or changes made by residents. The mean for the perception of identity in Kerdasa was 69%. The strong similarity between the satisfaction rates given for appearance and identity in Kerdasa should be noted, thereby indicating the relationship between the two variables.

8.6.13 Overall Home Satisfaction

This variable aims to arrive at an overall satisfaction variable for both samples on the home. It is presented on a five-point scale of satisfaction (nominal scale), asking the samples to evaluate their overall satisfaction of dwellings. The Chi-square statistical test showed a significant result. The results of both samples are presented in **Fig: 8.22**. The chart shows far higher satisfaction levels in Kerdasa than in al-Asher. There can be many reasons for this of which a sense of pride of place and possessions may be significant to the Kerdasa residents. Viewing primary

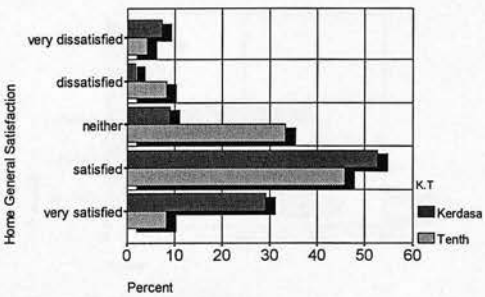


Fig: 8. 22 Overall Home Satisfaction

variables of satisfaction in the home (such privacy or structural quality), it is found that in fact Kerdasa does show a higher satisfaction rate in general which is backed up by the overall satisfaction indicator just presented.

8.7 Evaluation of Perceptions Towards Neighbourhood and Urban Form

The following factors are meant to evaluate the neighbourhood environment each on a five-point scale from 1-100%.

8.7.1 Sense of Security

This variable is intended to measure people's perception of security of the samples of the survey. The respondents can interpret this in many ways. It could mean security from theft and violence, or it could mean security from fast car traffic. This variable showed statistical significance. **Fig: 8.23** shows the frequency of sample responses. It indicates clearly that there is a larger sense of security among the Kerdasa sample than al-Asher. About 75% of the population rated their sense of security in Kerdasa from 80-100%, while only 38% gave the same rating in al-Asher with the rest of the population giving a smaller rating. People in al-Asher who gave lower ratings for sense of security usually lived near very busy streets, or very quiet ones. In the first there is lack of security because of traffic and the second because there is fear of crime. In Kerdasa, street lighting was provided by the residents, demonstrating a co-operative nature to improve their environment and make streets safer.

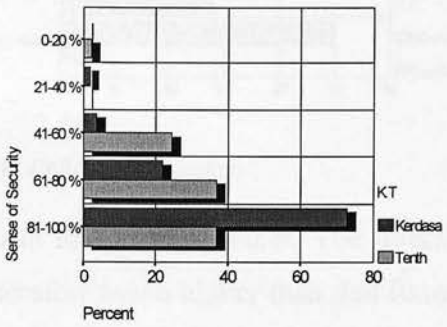


Fig: 8. 23 Sense of security

8.7.2 Tranquillity

Tranquillity did not show a statistical significance between the samples of the survey. **Fig:8.24** shows the results of the perception of tranquillity in their neighbourhood. The result shows a slight advantage in al-Asher than Kerdasa. The reason for this might be because Al-Asher has many vacant apartments, and this makes many streets quiet. Loss of tranquillity in Kerdasa is mostly as a result of children playing in the street, or living on a main street which has significant economic activity situated along it. However in both areas, there is a high level of tranquillity in comparison with other central areas of

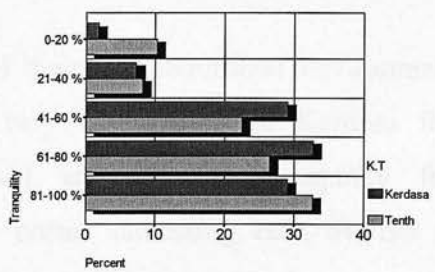


Fig: 8. 24 Tranquillity

Cairo. The fact that the community in Kerdasa is closely knit ensures that neighbours try not to disturb each other.

8.7.3 Social Interaction

The importance of this variable is not only because it is capable of assessing the quality of the neighbourhood environment, but also because of community relations and cohesion. It is statistically significant. **Fig: 8.25** shows peoples perception in both these samples. Almost 50% of the Kerdasa sample rated social interaction from 80-100% in comparison to 5% in al-Asher. The overall rating in terms of social interaction in Kerdasa is therefore much higher than that found in al-Asher. A strong reason for this is that most families in Kerdasa have lived there for a long time, creating strong ties between its residents, many of whom are members of large extended families.

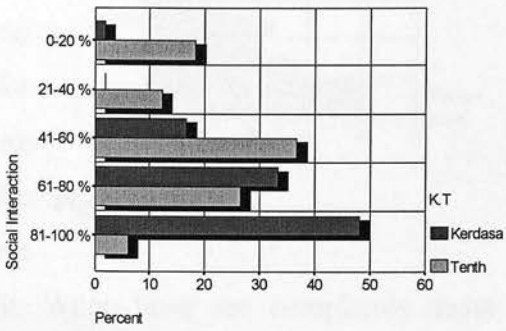


Fig: 8. 25 Social Interaction

8.7.4 Neighbourhood Maintenance and Cleanliness

This variable assesses the local environment in terms of its cleanliness, and overall maintenance and management. It showed statistical significance. **Fig: 8.26** shows the results of responses about their satisfaction of the quality of their neighbourhood. Almost 60% of the Kerdasa sample rated the neighbourhood from 60-80%, which is a majority. While in al-Asher more than 40% rated their neighbourhood environment from 0-20%. Responses of both samples are very contrasting. In Kerdasa the maintenance management of the neighbourhood environment is equally the responsibility of all residents through acceptable norms indicating each dweller is responsible for the area in front of his or her property. In the case of a shop the same applies. In al-Asher there are no locally formulated norms that govern the place, instead the local authority is expected to maintain, manage and clean. Often the state does not provide the basic needs in the neighbourhood environment, such as installing adequate rubbish baskets or providing lighting in the streets. This causes the perception rating to decrease.

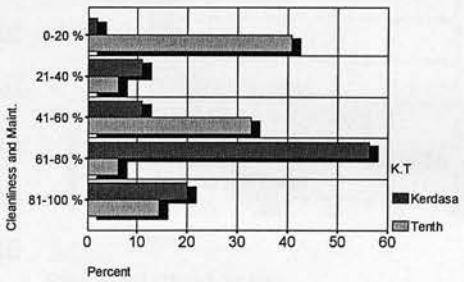


Fig: 8. 26 Maintenance & Cleanliness

8.7.5 Pollution

This variable did not show statistical significance. While the majority of both samples rated pollution highly, significant numbers gave low satisfaction ratings. Al-Asher sample rates slightly higher for pollution than Kerdasa. In al-Asher a high rating can be explained by the fact that it is on the outskirts of Cairo and because it does not yet have high amounts of car traffic moving through it. When there are complaints about pollution, it is a result of garbage dumping which is not uplifted, ultimately causing diseases. In the case of Kerdasa the complaints about pollution were in relation to the dirt roadways that are used in the settlement, and sometimes non-existence of an appropriate sewage network. The community will often spray water on the roads and walkways to prevent dust from becoming air-borne, particularly in summer in addition to reducing the effect of heat.

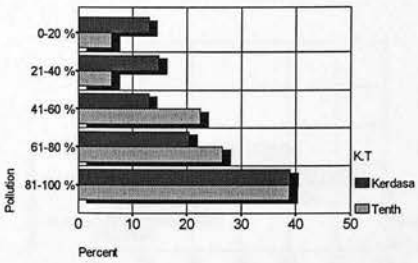


Fig: 8. 27 Pollution

8.7.6 Child Safety

This variable is used to assess the neighbourhood environment in terms of providing safety for children. It does not relate to the provision of designated playing areas for children, not found in either settlement. The statistical test showed the results of this variable to be significant. **Fig: 8.28** shows the results of people's perceptions in both samples. Almost 50% of the Kerdasa sample rated child safety 80-100% satisfactory. The difference between the two samples in this variable is strong. The fact that most streets are very narrow and do not allow cars to move freely, is the reason why the perception of child safety is higher. This is not the same situation in al-Asher sample. Areas that are not lighted at night might also contribute to the sample perception in al-Asher.

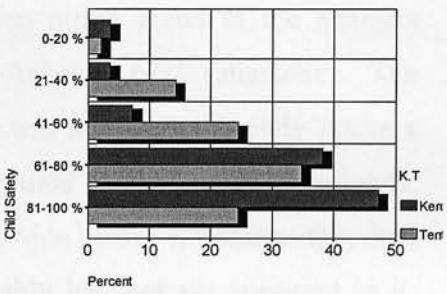


Fig: 8. 28 Child Safety

8.7.7 Overall Neighbourhood Satisfaction

This variable evaluates the overall satisfaction of the samples in terms of perception of their neighbourhood environment. This variable shows a statistical significance indicating that the results in **Fig: 8.29** are reliable and that the difference in ratings is genuine. 25% of the sample in Kerdasa rated the overall neighbourhood environment 80-100% satisfactory, while a majority of 55% rated it 60-80% satisfactory. In al-Asher only 10% rated it 80-100% satisfactory and less than 45% rated it 60-80% satisfactory. There is a genuine difference here which can be explained by stronger social ties between residents in Kerdasa, and a stronger effort to self-maintain their environments.

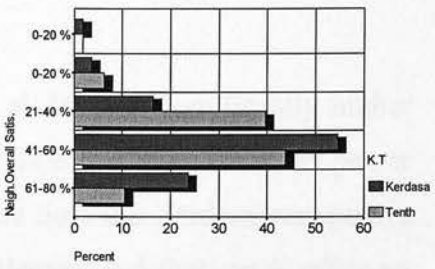


Fig: 8. 29 Overall Neigh. Satisfaction

8.7.8 Central Sewage Network

This variable relates to the provision of an appropriate central wastewater facility. This might be something to be taken for granted in many places in the world and even in Egypt, but it is by no means provided everywhere in an appropriate and efficient way. This variable test is statistically significant. The mean rating given in the Kerdasa sample is almost 90%, while the mean rating in al-Asher is 67% satisfaction. The explanation for this is that, at the time of survey, there was a process of newly fitting a wastewater and sewage system in the area after a long time of continuous complaints. This may have made peoples perception of the new service positive, because they had lived so long without it and also because faults probably had not yet appeared in it. However, it must be said that many areas still have not been fitted with the network. In some places small networks had been made and managed by the small community that benefited from it. The complaint in al-Asher was that the sewage network was always blocking up and over spilling into the streets. Many blamed the residents for misusing the system, while others complained that the network pipes are not up to standard.

8.7.9 Central Water Supply System

This variable, like the previous showed a significant statistical result. In this case the mean result for the sample in al-Asher is higher than that of Kerdasa (75% / 51%). The reason for this is that the water supply in Kerdasa depends on the digging of wells in the ground by the local residents. This is not the case in al-Asher, and there are frequent complaints about the quality of the water in Kerdasa. Part of the reasons is also that they

see it as their right to be afforded water supply like the rest of Cairo, not necessarily because the system they initiated and maintain is flawed.

8.7.10 Central Electricity Supply

This variable is statistically significant. The mean for al-Asher is significantly higher than the mean for Kerdasa (83%/78%). The reason for this is that there are many power cuts in the Kerdasa, not found in al-Asher. At the same time the Kerdasa community feel there is not enough effort being put into their settlement and that much relies on their own initiative, e.g. lighting of streets. It is also true that the power supply is very weak and that sometimes electricity wiring and network is left uncovered all of which contributed to a satisfaction level less than that in al-Asher but which at the same time is quite close to it. All this is not found in al-Asher settlement although there are many streets that lack lighting. But as a whole satisfaction there is slightly higher.

8.7.11 Street Paving / Maintenance

This variable will not be used as a comparison between the two samples because Kerdasa does not have any of street asphalt or paving of any sort. This variable was therefore only applied to al-Asher sample that showed a satisfaction level of 46%. This is not a strong satisfaction level for a place that has asphalt and some paving compared to the dirt roads and walkways found in Kerdasa. It can be explained by viewing the quality of the streets which even if they are void of pot holes still are have no adequate walkways for pedestrians. This is something that the population of al-Asher feels conscious about because near by areas have adequate street finishing and they feel that they are due the same.

8.7.12 Neighbourhood Appearance

This variable shows statistical significance although the means for both samples differ. Mean satisfaction in Kerdasa is 61% while in al-Asher it is 51%. This variable is strongly related to that of house appearance and identity. Again the satisfaction with the appearance of the neighbourhood environment in al-Asher is low because of monotonous building form types. In the case of Kerdasa a low satisfaction rate can be attributed to impoverishment of building materials and lack of finance to upgrade. In both samples some improvements are being made to the appearance of the environment through private efforts such as planting trees and shrubs; sometimes even installing better tiles for walkways. Residents will upgrade their immediate environment to the extent of their ability when the state does not. However this effort to improve ones surroundings is much more evident in the Kerdasa, possibly because there is a feeling

that the public areas are actually a co-operative responsibility under collective ownership. This sense of community and collective responsibility cannot be found in al-Asher to the same level.

8.7.13 Neighbourhood Identity

This variable is confined to the Kerdasa sample because of the repetitiveness of building types in al-Asher. The sample perception of identity in their neighbourhood in Kerdasa is 69%. This number is very close to that for home identity because both variables are related in their meaning. Also, because reasons for assessing satisfaction with neighbourhood identity rely upon the combined identity of homes, rather than any features outside of the home. This is because there is no predetermined urban design scheme, and because identity is gained through the collective effect of the building forms together. Other factors, like the existence of a mosque, define the identity of any area, and sometimes are combined with beautification schemes by the community. Appearance and identity, whether it of the home or the neighbourhood environment, seem to be all closely related, particularly in this case.

8.7.14 Combined Evaluation of Dwelling and Neighbourhood

Satisfactions for those chosen variables of home satisfaction are listed in **Fig: 8.30**. Not all the variables below showed statistical significance. Statistical significance did not correspond with many strong differences between the means of the two samples. The variables used in the evaluation of respondents' perception of their satisfaction towards aspects of their dwelling are divided into technical, environmental and aesthetic. Aesthetic are those of spatial distribution, privacy, home appearance, home identity, and home satisfaction. Environmental here refers to air ventilation, winter cold, light penetration, and sound insulation. Technical refers to internal water supply system, sanitation system, electrical system, structural quality, and internal finishing. The only variable that showed a higher satisfaction level in al-Asher is the internal water system. There is a 20% difference in the overall satisfaction rates in the variables in the Kerdasa sample than it is in al-Asher sample with regard to dwellings.

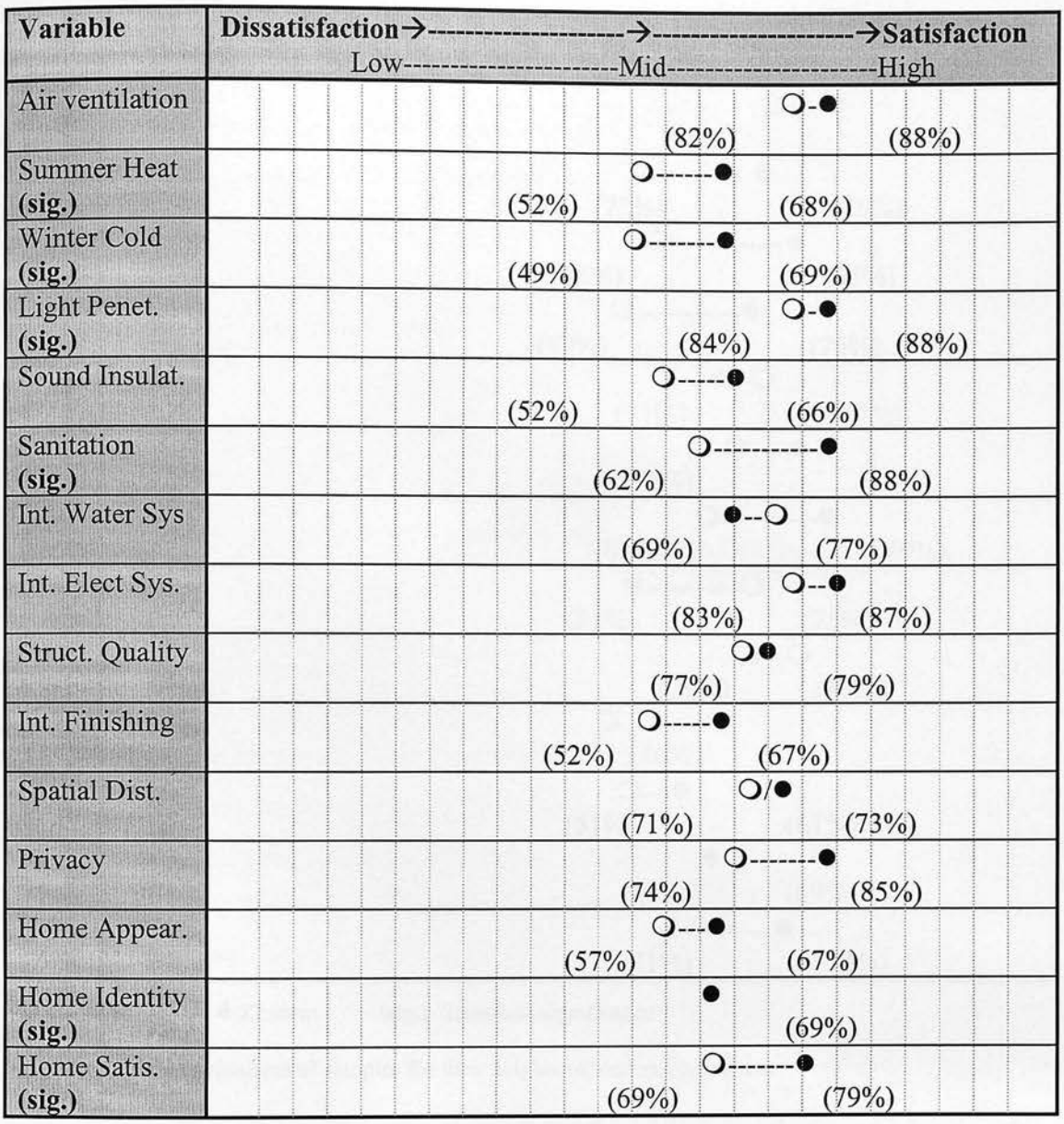
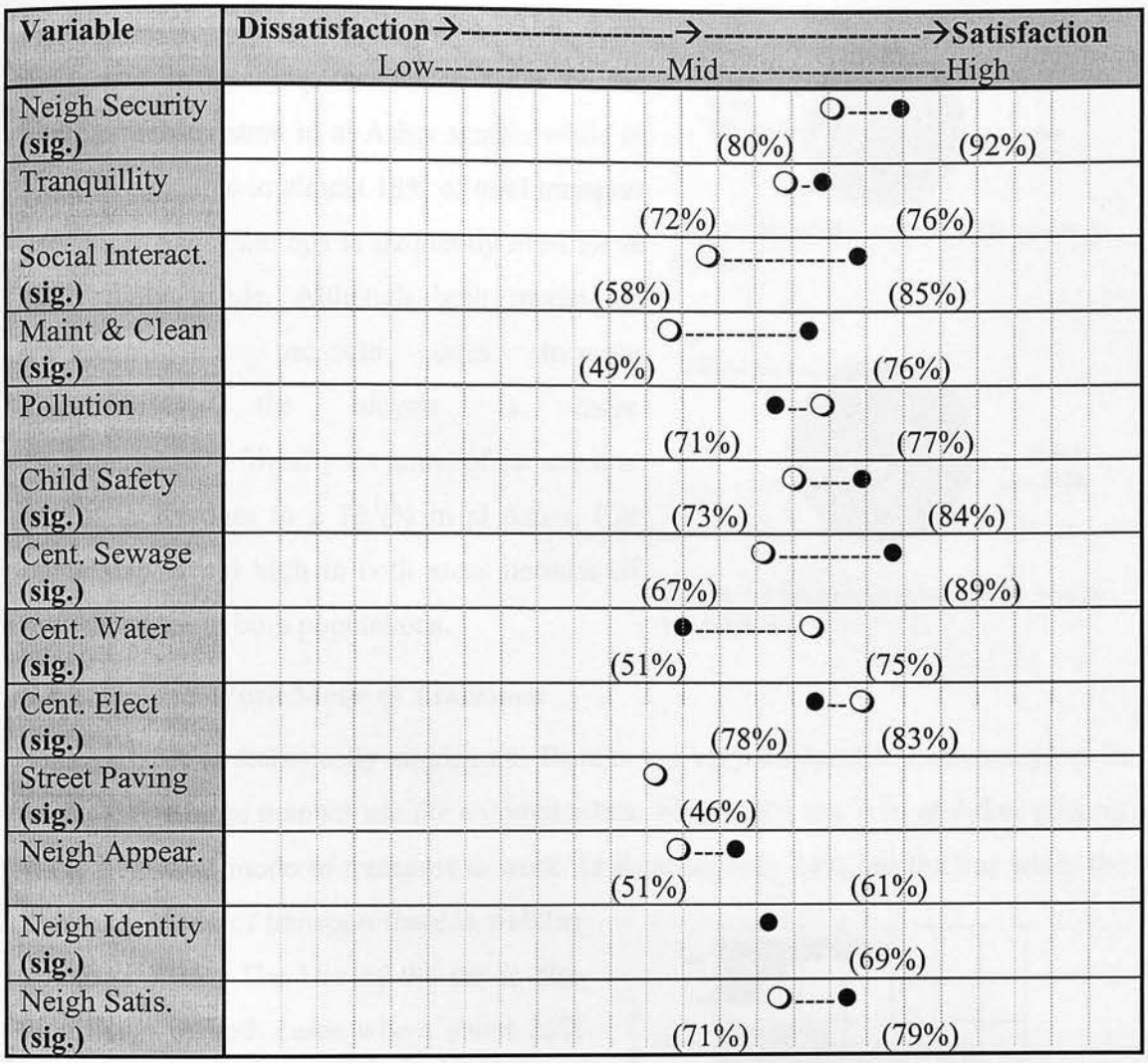


Fig: 8. 30 Mean evaluations of samples for their dwellings

Variables relating to the quality of the neighbourhood environment can be found in **Fig:8.31**. In this case a much larger number of variables are statistically significant. Four variables had a larger satisfaction level in al-Asher than Kerdasa these are pollution, central water, central electricity and street paving. This meant that the overall satisfaction variable in terms of infrastructure is 8% higher in al-Asher. Other variables showed a significant advantage in Kerdasa such as; tranquillity, security, child safety, and social interaction. Also the identity of the neighbourhood and appearance were more widely appreciated.



○ al-Asher ● Kerdasa **(sig.)** Statistical significance

Fig: 8. 31 Mean evaluations of samples for their neighbourhood environments

8.8 Overall Settlement Variables

The following are variables relating to the overall settlement as a whole. Some backup sustainability variables which follow, and some to social qualities of the neighbourhood; and some to quality of the settlement itself.

8.8.1 Transport for Needs

Q: *Define on a percentage scale how much you use the following transport modes to satisfy your needs.*

This variable aims to measure the use of different modes of transport in order to fulfil daily needs. It differs from the following variable that only relates to modes of transport to and from work. It defines to some extent the existence of services and their vicinity. As can be seen in both **Fig: 8.32** and **Fig: 8.33**, walking is the main mode of transport to fulfil daily needs in both samples. The amount of respondents walking is very similar,

being slightly higher in Kerdasa. The main difference is in the percentage for use of the bicycle; non-existent in al-Asher sample while in Kerdasa amounts to almost 18% of total transport use. In al-Asher the bus is frequently used for to fulfil daily needs. Although both modes of transport are valuable ones towards sustainability, the bicycle is more environmentally friendly. In terms of car use it is 10.9% in Kerdasa to a 16.7% in al-Asher. Car ownership is not high in both areas because of low affluence in both populations.

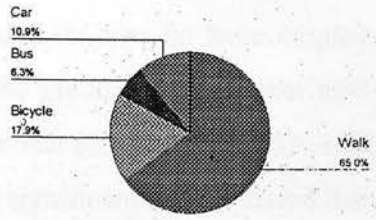


Fig: 8. 32 Modes transport for needs in Kerdasa

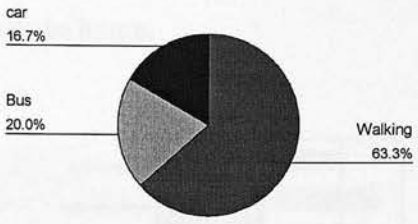


Fig: 8. 33 Modes of transport for Needs In al-Asher

8.8.2 Home / Work Mode of Transport

This variable is statistically significant. Results are very different in both samples. In both cases a large number use the commuter bus. About 58% use it in al-Asher making it the dominant mode of transport to work. In Kerdasa only 24% use the bus while the dominant mode of transport there is walking which is 38% . The Use of the car is also significant in both cases where about 25% use the car in both samples. The high level found using walking to get to work, reflects the vicinity of work to home in the Kerdasa.

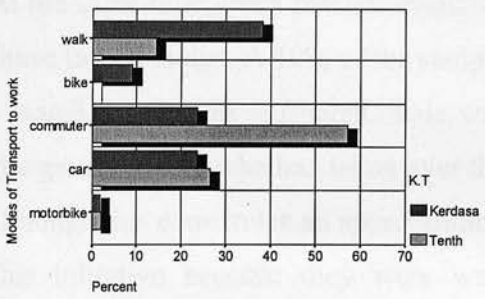


Fig: 8. 34 Modes of transport to work.

8.8.3 Home / Work Spatial Relationship

This variable showed statistical significance. It detects the need for transport use to work in both samples. It also indicates mixed use in the urban environment. Most important, it assesses the relationship between home and work. It showed statistical significance. In the case of al-Asher sample it can be seen that a majority (58%) of people stated that they lived one bus ride distance away from work and another 26% stated that they lived more than one ride distance away. Although one ride is not bad, however it may be a long one. It also seems that individual

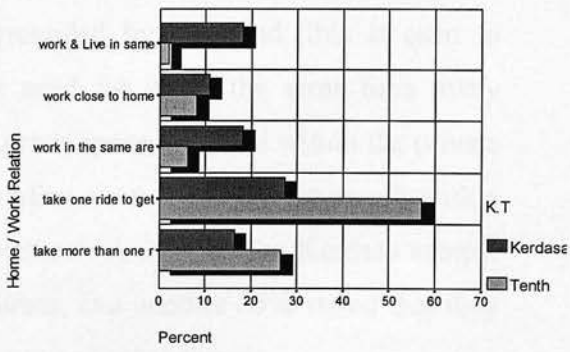


Fig: 8. 35 Home / Work Relationship

choice of location of residency to some extent depended on how far from employment the home was located. In the Kerdasa sample, also the predominant number said they live one ride from work but the percentage in this case was 28%. Another 16% said they lived more than one ride from work. At the same time significant figures stated that they worked and lived in the same neighbourhood (18%), another 11% lived close to home, and 18% lived and worked in the same area. This shows the home / work relationship is stronger in Kerdasa and that work lies in closer vicinity to home.

8.8.4 Contact with Green Areas

This variable is of a qualitative nature that showed statistical significance. It assesses contact with green areas that improve the quality of living in the urban environment. **Fig: 8.36** shows the percentage of frequency of responses of the samples. Responses in al-Asher sample indicate very little contact with green areas. A 32% stated that there was no contact and another 35% stated that it was insufficient. This is because the design does not contain many public gardens. At the same time green patches available between buildings are not maintained at all and have turned to dirt. A 10% of the sample stated that they had a lot of contact and 15% stated that it was sufficient. This was probably reflecting the cases of those living on the ground floors who had taken over the adjacent areas and planted them as their own. Although this constitutes an appropriation of public land, most residents appreciated this initiative because they were well maintained and provided good aesthetic appearance in the neighbourhood. In the Kerdasa sample there are no public allocated green areas. However, since the settlement is originally a farming one and that it is surrounded by farmland, this is seen to substitute green areas rather than fulfilling the need for it. At the same time many dwellings were on the peripheries and some had green space allocated within the private property. Green space within private property is often an area left for future use with a need for extra space or kept as a property investment. A 29% of the Kerdasa sample stated that they had a lot of contact with green areas, and another 35% stated that they had sufficient contact. Those were the dominant groups in that sample.

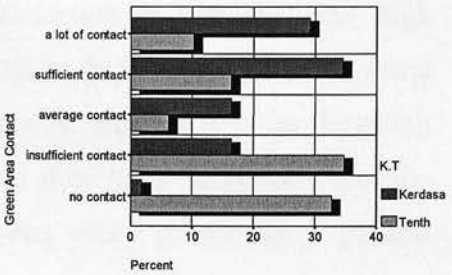


Fig: 8. 36 Green Area Contact

8.8.5 Evaluation of the Urban Environment and Its form

This variable did not show statistical significance. It assesses the samples' satisfaction with the urban form and environment holistically. It reflects the satisfaction of the samples with form whether it is organic as in Kerdasa or planned as in al-Asher. **Fig: 8.37** shows the percentage frequencies of both samples, which indicate a slight advantage for satisfaction in Kerdasa. The high satisfaction rate contrasts much complaint by residents in both settlements and some negative satisfaction rates in previous variables. This is because it is an Egyptian cultural quality that one should be content with what they have. It appears that the individual is comfortable to state individual problems while professing a general satisfaction.

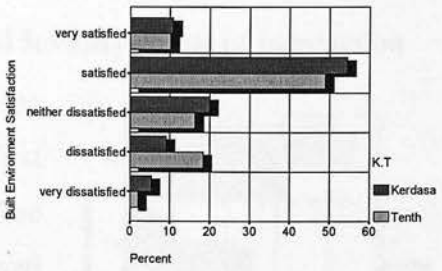


Fig:8. 37 Evaluation of Urban Environment

8.8.6 Comfort / Discomfort due to Light / Shade

This variable intends to assess comfort levels found in the streets as a result of sunlight and heat. This variable tests the notion that narrow streets can be more comfortable for pedestrians, where narrow streets are a characteristic quality of organic built form as found in Kerdasa. This variable is statistically significant. The Kerdasa sample shows an almost 80% mean comfort level in Kerdasa, while in al-Asher perception of comfort is 43%. This reinforces the notion of higher comfort levels in an organic built form and in narrower streets. It does not necessarily mean that narrow streets are better in all qualities but in terms of light and shade they seem to promote comfort from heat. Streets that are too narrow, as will be seen later in the open ended questions, are often a complaint in the Kerdasa sample.

8.8.7 Comfort / Discomfort due to Level of Crowding

This variable intends to assess the comfort level in settlement with regard to crowding. It did not show statistical significance. The mean comfort levels in both samples are very similar although it is slightly higher in al-Asher sample at 77.5% to 75% in Kerdasa sample. In both cases there is a high level of comfort and satisfaction in relation to crowding. In Kerdasa, although it is fully populated, the hierarchical form of its spaces and its dead end streets reduce over-crowding. Al-Asher is not fully inhabited yet and therefore its pedestrian capacity has not yet been reached. At the same time streets

are planned to be large in width. Both these factors work to alleviate any crowding that might exist.

8.8.8 Social Interaction, Availability of Places and Identity Areas of Interaction

These three variables aim to give an indication of the level of social interaction in both the samples. The first one is a dichotomous question of whether or not the local resident meet to socialise. This variable showed statistical significance. More than 80% said yes people did meet and socialise while only 40% did so in al-Asher sample (**Fig: 8.38**). The second variable was if there were enough appropriate places for social interaction where the respondent lived. This variable also showed statistical significance. In Kerdasa about 85% percent thought there were enough appropriate places for social interaction while in al-Asher only 25%. Through observation, both seem not to have areas allocated for social interaction. But at the same time the Kerdasa community made available places for socialising cooperatively.

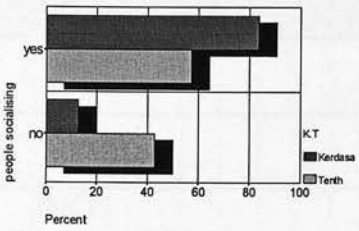


Fig: 8. 38 Social Interaction

The last variable is an open-ended question about the identity of places used for socialising. Different places were identified in both settlements. In both samples homes were the places most mentioned for socialising. In Kerdasa the street was the second most mentioned, also occasion (function) halls and mosques showing high frequency. Occasion halls are structures made by families where certain activities are held like funerals or weddings or private meetings. Large extended families will provide them and anyone is allowed to use them, whether a member of the family or not. This demonstrates a civic feeling between the community in Kerdasa by co-operating for the good of its' residents. The market place and front Mastabas (benches) are also often mentioned. In the case of al-Asher, coffee shops are the second most mentioned places for social interaction. Streets, mosques and youth centres are other commonly mentioned places there. In general the places mentioned are not much different, but rather the frequency of mentioning them is what differs between the samples.

	Home	Street	Coffee shop	Occas Hall	Mosque	Market	Front Bench	Youth Centre	Elders Home	Back garden
Kerdasa	34	16	9	14	13	3	4	5	3	1
al-Asher	14	6	13	1	11	4	0	6	0	1

8.8.9 Combined Evaluation of Settlement Variables

The following figures sum up the three variables used to evaluate the settlement quality as a whole, which are built environment, light shade, and crowding.

Variable	Dissatisfaction→----------→----------→Satisfaction Low----------Mid----------High
Built Env.	○/● (50%)
Light Shade (sig.)	○----------● (43%) (73%)
Crowding (sig.)	●/○ (75%) (77%)

Fig: 8. 39 Settlement Evaluation

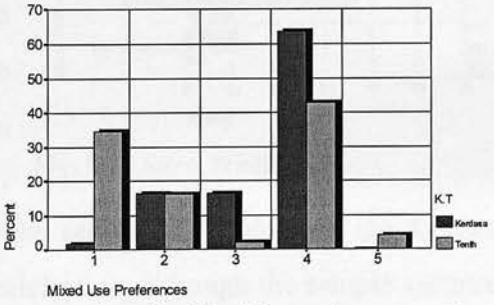
8.9 Sustainability Variables

The variables below are more oriented towards identifying sustainability variables. Some of the previous variables could also act as sustainability variables, such as those evaluating the quality of the built form. Those below more specific to sustainability.

8.9.1 Mixed Use Preference

Q: *What do you prefer in terms of mixed use?*

This variable is not meant to measure if there is mixed use in the settlements or not because this can be done through on site observation. It is meant instead to measure the preference towards mixed use. The Kerdasa sample through observation is more prone towards mixed use than al-Asher. Although mixed use in al-Asher is increasing, it happens in an illegal and unplanned manner but not to the extent found in Kerdasa. This variable proved to be significant statistically. In both samples the dominant number of respondents stated that they preferred residential areas to be mixed with all activities except those that cause pollution, 63% in Kerdasa and 42% in al-Asher sample. However, 35% of al-Asher sample stated that they thought residential areas should not be mixed with any other uses. This demonstrates a strong divide in the opinions of al-Asher sample, possibly reflecting the background of the interviewees.



1- separation of residential area from any other
2- separation of residential from all except small shops
3- mix of residential with commercial areas except of productive used and workshops
4- mix of residential with all except those that produce pollution
5- complete mixed use without restrictions

Fig: 8. 40 Mixed Use Preference

8.9.2 Mixed Use Agreement

This variable reflects on a number of things among which mixed use itself. It determines the ability of the local community to agree on what activities should be allowed to operate within residential areas of the urban environment, and therefore impacts on the cohesion of the community. This variable showed statistical significance. **Fig: 8.41** shows that the results from the two samples are very different. Almost 70% of al-Asher sample thought that the local community could not agree on this. While in contrast 60% in the Kerdasa stated the opposite and that the local community could agree on what uses should be permitted in the neighbourhoods. This reflects the cohesion of the Kerdasa community and the willingness to work together. This is not found in al-Asher population.

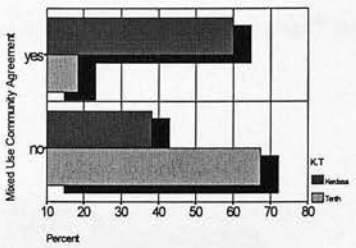


Fig: 8. 41 Mixed Use Agreement

8.9.3 Street Width Satisfaction

This variable is meant to measure respondents' satisfaction with street widths. It showed statistical significance. **Fig: 8.42** shows that there is very strong difference in opinion between the two samples. Al-Asher sample shows a dominant satisfaction with street width, which is supported by on ground observation of streets that occupy a large part of the area of the settlement. In contrast the Kerdasa sample shows that there is a larger level of dissatisfaction, although the sample seems to be divided. The reason for this is that in many cases streets are very narrow indeed. This enabled residents to make most use of space by including it in private ownership rather than public. A common complaint was that it was difficult to transfer building materials. It is also true that narrow street widths are associated with poor living, and therefore not appreciated.

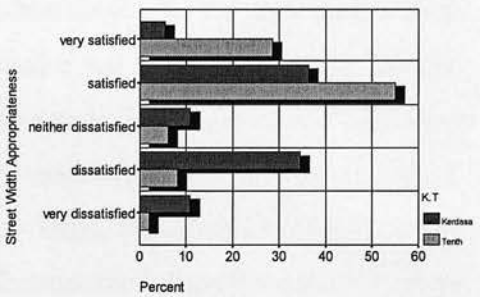


Fig: 8. 42 Street Width

8.9.4 Building Density Satisfaction

This variable is meant to measure the satisfaction of the samples with local building densities. The variable shows no statistical significance. **Fig: 8.43** shows that the samples have very similar responses, although there is a slightly higher

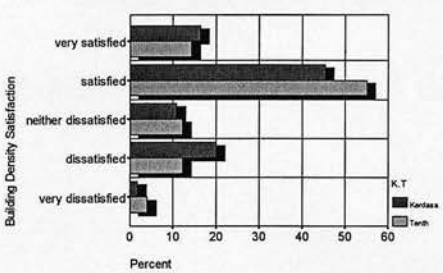


Fig: 8. 43 Building Density Satisfaction

satisfaction in al-Asher sample. In both samples the populations are pre-dominantly satisfied with local building density. As seen in the calculations made earlier the building densities are not very different. It is therefore expected that responses should be similar.

8.9.5 Transport Satisfaction

This variable is meant to measure respondents' satisfaction with transport, rather than to measure the samples use of different modes of transport. The variable showed statistical significance. **Fig: 8.44** shows the satisfaction levels of each of the two areas. It is evident that satisfaction with transport is higher in al-Asher than it is in Kerdasa. The question was directed at the public transport system. This is so because both areas are not affluent and provision of transport to them relates only to private and public bus routes. In the case of al-Asher, high satisfaction can be explained by there being a major bus terminal in the settlement. Before, there was complaint of a lack of buses serving the local population. But later with the increase of the population, bus routes were made available. In Kerdasa this is not true because the settlement as a whole is not very large, and therefore not many bus routes were made available by the state. Residents feel the state should provide for them transport facilities, explaining low satisfaction. Since al-Asher was initiated by the state it seems it was more obligated to provide transport facilities.

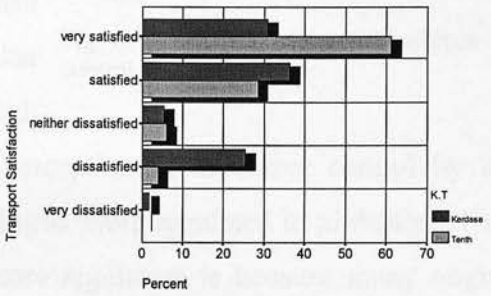


Fig: 8. 44 Transport Satisfaction

8.10 Variables of Community Control

The forth-coming variables relate to community control variables derived in the theoretical chapters of this research, and compiled in the previous chapter.

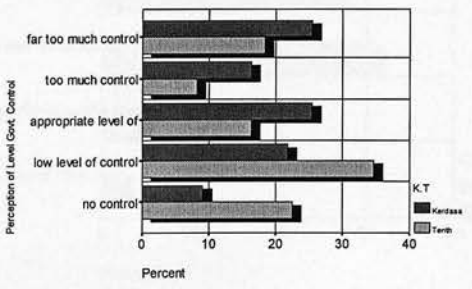


Fig: 8. 45 Perception of state control

8.10.1 Perception of State Control

This variable is meant to measure the perceptions of the samples in terms of state control over the building process. This variable showed statistical significance. **Fig: 8.46** shows that there was a stronger perception of state control in Kerdasa than it was in al-Asher sample. Both figures show that respondents perceive that there is not enough control in al-Asher sample, while there is a perception of excessive control by in Kerdasa. These goes against the fact that building is more regulated in al-Asher. The reason that al-Asher residents seem to want more regulation is because many might want to prohibit illegal extension to blocks, and this is associated with disorganised and bad built form. While in Kerdasa although there is far less state controls, at the time of the survey there were new laws that were taking effect which impeded residents freedom to build. The community did not appreciate this increase in controls. **Fig: 8.45** indicate that both samples did not approve of the level of state control. This variable, together with the one proceeding it indicates one sample wishes for further controls while the other less. One because of a fear of their built environment becoming disorganised, and the other because there is a need to continue the local ways of building for themselves on land that was bought on the assumption that it would be developed.

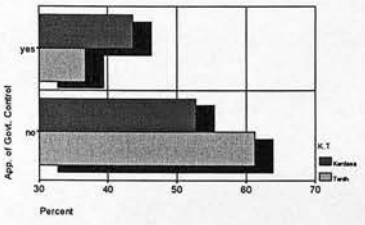


Fig: 8. 46 Approval of the level of state control

8.10.2 State Controls on Extensions and Changes to Existing Built Forms

This variable is meant to measure the level of state control on making extensions to existing buildings. These extensions take two different forms in each of the two different samples. In al-Asher sample, extensions relate to the haphazard unplanned extensions made by residents, whether by state permission or not. In Kerdasa sample this refers to building an extra floor or room and so on. **Fig: 8.47** shows the preferences of al-Asher sample towards the extensions made there. There is a very strong divide between the residents on whether these extensions should be allowed or not. This is

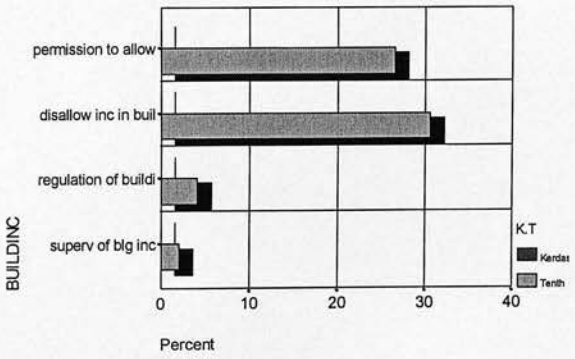


Fig: 8. 47 Unorganised Building Inc.

understandable since those residents that did undergo extensions would appreciate them because of the increase in floor space allowed. Conversely those that did not do so, might be against these unplanned extensions aesthetically. This was an open-ended question and some of the sample did advocate the regulation of these extensions.

It appears that the extensions made to the original buildings determined the responses given to this variable and the one before. In terms of the level of control by the state regarding extensions, responses in al-Asher are similar to those of the previous variable. But in the case of the Kerdasa sample, people were more satisfied since the state did not apply too much regulation in terms of making extensions as it did in terms of building from scratch. The community therefore satisfied. This appears in **Fig 8:48**, where the satisfaction with state controls is higher in Kerdasa.

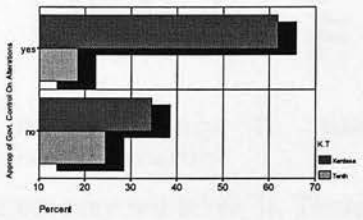


Fig: 8. 48 Satisfaction with State Control over extensions.

8.10.3 Need to Make Alterations / Physical Ability

The following two variables back up the previous. They measure the samples of the perception of the importance of the need to make alterations and their physical ability to do so. **Fig:8.49** shows the respondents perception of the importance of this ability. This variable did not show statistical significance, but there is stronger agreement among the Kerdasa sample of the importance of this ability than in al-Asher. **Fig: 8.50** shows the physical ability of the samples to make these extensions. This variable showed statistical significance, and a larger agreement on the part of the Kerdasa sample that they could make these extensions. This is understandable because of the ownership of land and methods of building. Those in al-Asher who did see that they could make physical extensions, did so because of the availability of area to make extensions on their buildings.

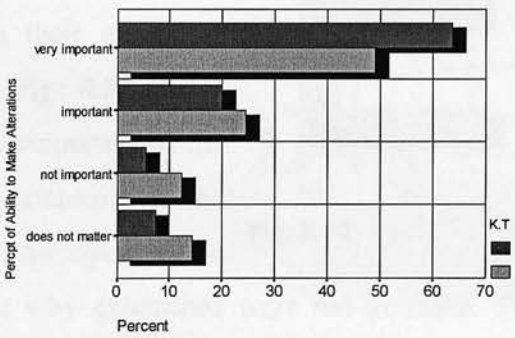


Fig: 8. 49 Imp. Of Ability To make ext.

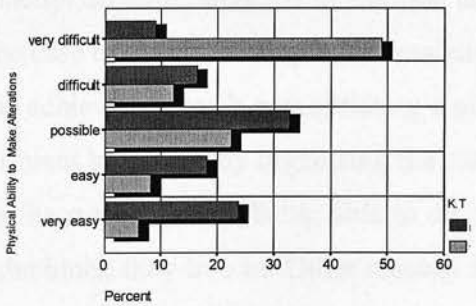


Fig: 8. 50 Physical ability to make ext

8-10-3/1st Perception of Ability to Make Internal Alterations / Reason

This variable is meant to measure the ability of the samples to make internal alterations to the dwelling. It did not show statistical significance. **Fig:8.51** shows that both samples are similar in their responses. This variable was used because there are different reasons that would prevent people from being able to make internal alterations to their dwellings, of which might be that they are rented and not owned. Another is that the structure system may not allow it. These were not common to both samples. Sometimes apartments were rented in the case of al-Asher; while in Kerdasa when the structure system was wall bearing, partitions could not be altered. In some cases changes were reported not to be possible for financial reasons.

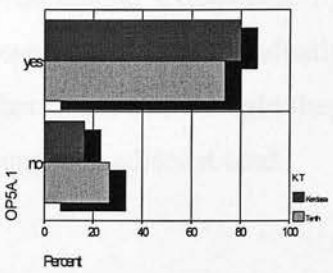


Fig: 8.51 Percp. To Make Internal Alterations

8-10-3/2nd Ability to Make Extensions / Reasons

This variable is intended to discover the respondents' ability to make extensions and the reasons, each in their individual situation. It showed statistical significance. **Fig: 8.51** shows that there is a strong difference between the responses of the two samples which indicate the making of extensions to the dwellings was possible more in Kerdasa. An open ended question added was to find out the reasons why extensions were not possible. The reasons given in the Kerdasa sample were mostly because there was no area left, and that the structure system had reached its capacity. Structure systems in Kerdasa are wall bearing mostly and sometimes skeletal. In the case of al-Asher sample the reasons given differed. In their case extensions can only be achieved through appropriating a piece of land that might be vacant in front of the apartment block and by organising the residents collectively into making the increases. Thus the reason for not being able to do so was that there was no area available in front of the block they live in. Other reasons for not being able to do so were because the dwelling was rented, or people not agreeing on how to do it, or being opposed to these extensions.

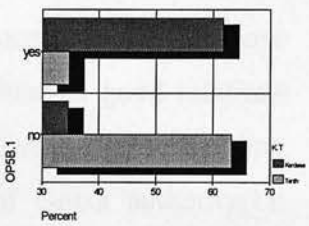


Fig: 8. 52

8-10-3/3rd Method of Making Extensions

This variable is an open-ended question meant to discover the ways that extensions are made, in different areas. In Kerdasa the majority stated that they could make both

horizontal and vertical extensions (13); a large number stated that they could only have vertical extension (10); three stated that they could make horizontal extensions; by purchasing a plot of land. The fact that land there is owned and built gradually according to needs must be remembered. In the case of al-Asher, those that thought they could make extensions, thought so based on the ability to occupy free adjacent land.

8.10.4 Local Control over the Building Process

Q: *Do you think the local community can have more control over the building process? And give reasons.*

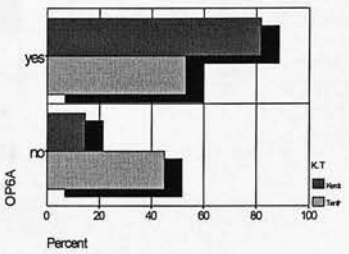


Fig: 8. 53

This variable showed statistical significance. **Fig:8.53** shows the responses of the samples, which convey strong difference in opinion between the two samples. The Kerdasa sample seems to approve of community control while al-Asher are divided between some who see the benefits of being able to make building extensions, and those who don't think this is possible. The second part is an open-ended question discovering the different reasons for their views. The reasons given among the Kerdasa sample are: because in interest of community (9); because community takes better care of its own property(7); because there is good relations between community members(4); the community has sufficient knowledge of building process(3); existence of system of clear norms(2); because of elders authority(1); community will take care of its problems faster and easier(1); because of little state authority(1). In the case of al-Asher the responses were: because in the interests of the community (15); they cant because community members never agree(5); can do so with supervision of state(3); community is not organised(3); community is not united(3). The responses in the last part are meant to show the array of different reasons rather than give statistical evaluation.

8.10.5 Suggestions on Increasing Community Control

Q: *How do suggest giving control to local community?*

This is an open-ended question meant to define ways for increasing local control from the point of view of the local population themselves (those who agree with increasing local control) and not by processionals, in order to discover an insight of the community itself. The responses in Kerdasa were: the appropriation of authority to elders from the state; allowing for community control within a legal framework; giving legal power to residents to execute their authority co-operatively. In al-Asher the only suggestion was to create owner unions between the residents. This suggestion was recently taken

seriously by the Egyptian government now creating a legal framework to turn the suggestion into reality. This question was only answered by a few who felt they had suggestions they could offer.

8.10.6 Existence Local Norms Governing Building Activity

This variable only applies to the Kerdasa and therefore was only addressed to one sample. Since residents in Kerdasa all built their homes themselves, it was important to understand their views on whether or not there were clear norms governing how they did so. **Fig: 8.54** shows that the vast majority of them did see that there were clear norms governing them. Some were then asked what those norms were. Such norms mentioned included prohibition of opening windows if the property owner built on the outer boundaries of his plot of land. It was suggested that a minimum setback of 1-1.5m was needed in order to open windows. Another norm were prohibition of making openings, whether doors or windows adjacent to another on an opposite property. This was for privacy, and to prevent an open clear view into the dwelling of another property. Many of these norms are similar to those mentioned in chapter 4.

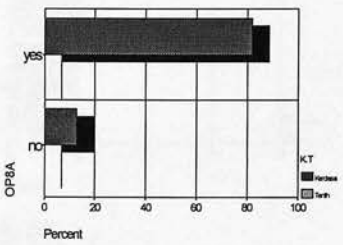


Fig: 8. 54

8.10.7 State / Community Authority Preference

This variable is intended to assess resident preference of state control as opposed to community control. This variable showed statistical significance. **Fig8.55** shows that there is a large difference between the responses of both samples. There is a strong agreement among the Kerdasa sample that the community should have more authority than the state, however they do not go to the extent wishing to eliminate all state control. A significant number also stated that authority and control should be divided between community and state. Al-Asher sample was divided in their opinion. Some thought that there should be only authority by the state, while another significant number thought that authority should be shared between community and state. Those

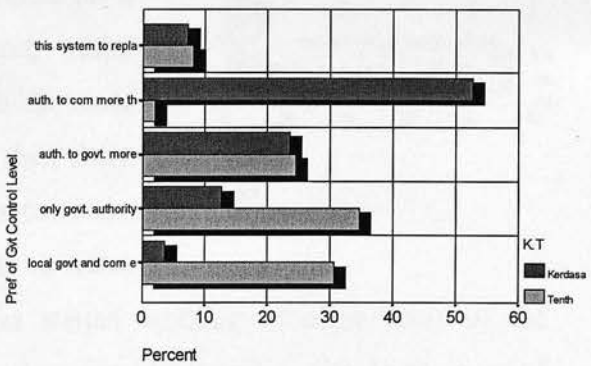


Fig: 8. 55

who were afraid of authority being in local community hands were afraid of the misuse of power by members of the community. This was not so in Kerdasa.

8.10.8 Norms Governing Public Areas and Street

This variable relates to the norms that may or may not exist to govern use of public areas. Like the previous, it relates more to the Kerdasa sample. **Fig:8.56** shows that the sample did see that there were norms governing the use of public areas; although not as much thought so as those who thought there were norms governing the building process. Such norms would relate to the cleanliness and the maintenance of the public environment and its cleanliness. It mostly relates to the up-keeping or management of the street environment.

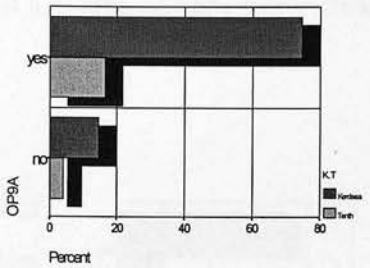


Fig: 8. 56

8.10.9 Infrastructure Maintenance

The following variables are orientated to identify the degree to which the local community or state maintains the infrastructure.

Q: *Does the local community ever make any repair on maintenance in relation to the following infrastructure?*

8-10-9/1st Water Supply System

Water supply system means different things in each of the samples. In Kerdasa the water supply relies on a number of outlets throughout the settlement, which provide pure water to the residents through the state system. The settlement depends on wells for their daily needs of water aside from drinking. There is therefore no real water supply system in the settlement. A water supply is being currently provided and has started working in some areas of the settlement. It is also true that the existing outlets often have water cuts. In the case of Kerdasa the water supply used for drinking is state made and maintained, while individual owners of property dig wells. **Fig: 8.57** shows the responses of the samples to whether or not the local community do any maintenance or repairs on the water supply system. In al-Asher there is no maintenance made on the part of the community. But in Kerdasa maintenance can be found because the digging of wells is part of the local water supply system, made and maintained by the community. At the same time the community often remedies any problems with the water outlets that are found. This

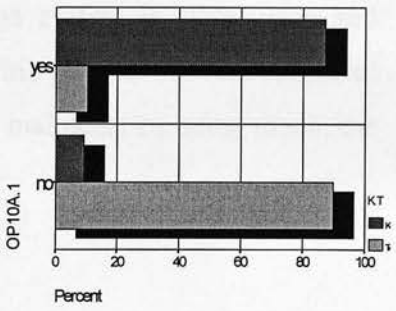


Fig: 8. 57

explains the responses given in **Fig: 8.57**. The respondents were also asked the scale of the maintenance being made; whether small, medium, or large. Most stated that the scale of the maintenance was medium (19), and some stated they were small (9); each probably depending on where they lived, and if they had a source of pure water close to them.

8-10-9/2nd Waste Water System

Waste water system also means different things in each of the both samples. In Kerdasa the waste water system relies on two systems. One of them is the making of individual waste disposal systems for each property by their owners. This means the local community controls the wastewater system. Individuals use seepage tanks when they are not connected to the main system. However this is not a good way to dispose of wastewater because it reaches the ground water. In some parts of the settlement a wastewater network was made by the individuals co-operatively to prevent the wastewater surfacing into the streets. This is a very good example of the local community working together to execute something in their interest and which is also a considerable task needing co-operation and co-ordination. In the case of al-Asher the system is state made and maintained. This explains the results found in **Fig: 8.58**. This variable showed statistical significance. Upon asking the samples of the scale of the maintenance being made, the majority saw them as medium sized maintenance.

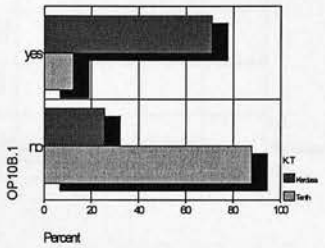


Fig: 8. 58

8-10-9/3rd Electrical Supply System

Both settlements have electrical supply systems installed by the state. Although there is a difference in both of the settlements, which is basically that the electrical system in Kerdasa is mostly through overhead cables, while that in al-Asher they are underground. It also means that the local community had more ability to apply maintenance since it was easier to do so, although overhead cables provide less safety. **Fig: 8.59** shows the responses of the samples to whether or not the local community made maintenance to the electrical supply system. This variable showed statistical significance. Similar to the last three variables, the sample in Kerdasa thought that there was maintenance being made, but in this case the not as many thought this was true. The scale of maintenance

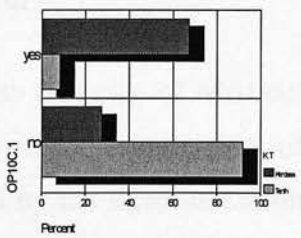


Fig: 8. 59

was medium to small scale. This indicates that the Kerdasa community was not as involved in maintaining the electrical supply system as other aspects of the infrastructure.

8.10.10 Infrastructure Maintenance: Community / State

This variable reinforces the last three and identifies who maintains infrastructure more. **Fig: 8.60** shows the responses of the samples, which differ strongly to each other. The Kerdasa sample had a larger number of people stating that the local community maintains infrastructure more than the state (45%). And significant number stated that only local community undertook maintenance (28%). The variances between the opinions tend to differ according to which part of the settlement they live in and the infrastructure services provided in each. In the case of al-Asher more than 80% declared that only the state made any maintenance which is the dominant opinion there.

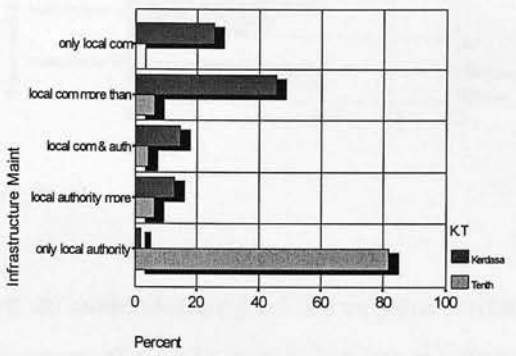


Fig: 8. 60

8.10.11 Satisfaction with State / Community Efforts

The aim of this variable is to find out the respondents' comments about the way things happen and the reasons. This variable did not show statistical significance. Looking at **Fig:8.61** we will see that al-Asher samples are more satisfied. It also shows a divide in the opinions of the sample in Kerdasa. With a larger number being satisfied that the local community was doing a lot to maintain their infrastructure. It seems to be part of the culture to take care of what one uses, while at the same time more state support is needed. In al-Asher sample, most are satisfied while about 30% were not satisfied. Comments given by the Kerdasa sample were; local government should be doing more because they have more responsibility (25); community and local government should co-operate (7); community will take better care of its facilities (4); because government has too much routine (2). Although people are satisfied with local efforts, they would still appreciate more support from the state. In al-Asher the majority also thought that the state should do more (13). In both samples, people would appreciate any support provided by the state.

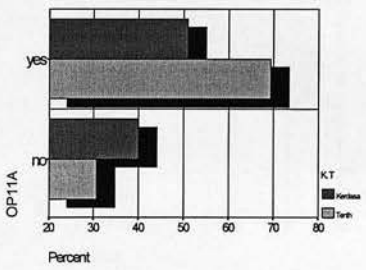


Fig: 8. 61

8.10.12 Organic Growth

This variable is meant to measure the sample perception of an organic form as a representation of a locally controlled urban environment. This variable showed statistical significance. In al-Asher the largest group stated that organic form creates bad urban form (30%). However significant numbers claimed it made good urban form. This is probably a result of the background of the respondent and if they have an understanding of the organic urban environment. In the case of Kerdasa, the largest group of people stated that organic form makes an average quality of built form (45%), while other significant groups of people thought it was bad. But as a whole the sample thought it made good form. It is possible that in the case of Kerdasa not a larger numbers appreciated organic urban form because it is associated with poor living poorly.

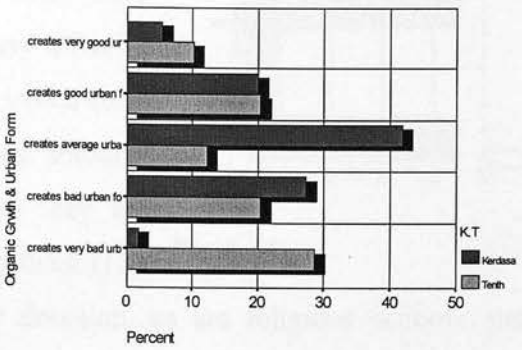


Fig: 8. 62

8.10.13 Co-operative Control over Common Elements

The following are a number of variables meant to discover elements in the urban form that are managed locally rather than by the state.

1- Urban Elements & Services Locally Managed

Q:Is there a local mosque managed by the community?

This variable did not show statistical significance. **Fig:8.63** shows the responses of the two samples. From the figure it is evident that both samples saw that the local community managed mosques. Building and managing a mosque is a cultural privilege in Egypt. A larger number of mosques are community owned and managed in Kerdasa. **Fig: 8.64** shows the responses of the two samples to whether there were other elements in the urban form managed locally. This variable leads to the following variable, which is an open-ended question meant to define the nature of urban elements or services that are locally managed. There were no such elements in al-Asher. But in Kerdasa there were many examples of community responsibility. The most important of these elements is the occasions hall, which each large family builds for the good of its community. In it weddings and funerals are held, and can also be used for other occasion an individual

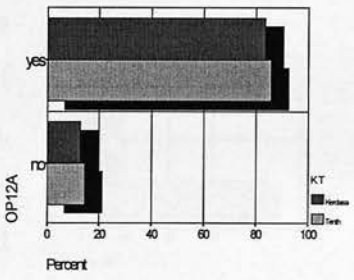


Fig: 8. 63

may wish to hold. Those who make and maintain them do not charge the rest of the community to use them. They are maintained by families and those who use them(9). Another of these elements stated are nurseries which seem to be common, and are sometimes they are initiated through a community effort and sometimes they are private and people pay to put their children in them (15).

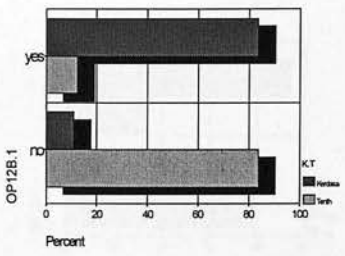


Fig: 8. 64

Others are orphans homes that are kept by donation, as are religious schools and cemeteries. Some elements made for profit such clinics and hospitals. Although they are not co-operatively managed, members of the community build them because there is a lack of health services in the area. People pay to get into them but they do not provide a lot of income for those who initially make them. In some places in Kerdasa there are also garbage collection systems initiated by the community itself and not by the state. Although this is a service rather than an urban form, it shows the community's ability to co-ordinate with each other. In al-Asher such elements are not found. But in a few cases people living in the same building will co-operate when appropriating and adjacent piece of land or by improving the aesthetic environment of their neighbourhood.

2- Preference For Local Management

The following variable is meant to measure resident satisfaction regarding their initiation and management of different elements and services not provided by the state. **Fig: 8.65** shows the responses of the samples to whether or not they approved of keeping the previously mentioned elements in community management. This proved of statistical significance. In the case of al-Asher it only refers to mosques. The figure shows that most people in Kerdasa approved of community management while those in al-Asher did not. This indicates a deep-rooted culture in the Kerdasa settlement for local control and co-operation. Reasons given for their responses are; because in local community interest (14); community is better able to take care of its own interests (13); reduction of routine and bureaucracy; to prevent corruption; because community is in more contact with on ground reality; confidence in community members; and state incompetence. Most of the reasons given here are similar to those given regarding the infrastructure.

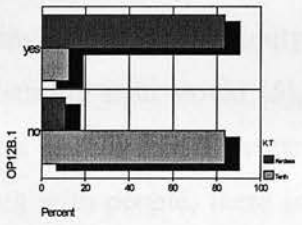


Fig: 8. 65

8.10.14 Existence of System for Conflict Settlement

This variable is meant to identify the existence of a system for conflict settlement (solving conflicts between different members of the community).This applies more in the Kerdasa sample as can be seen from **Fig:8.66**, which shows the responses of the samples to whether or not they thought there was a system of elders or distinguished people that would solve local conflicts. This variable showed statistical significance, and that there is a strong perception of such a system in Kerdasa rather than al-Asher. **Fig:8.67** shows the responses of the samples to whether or not the existence of this system was beneficial in their views. This variable showed statistical significance. It also shows that the Kerdasa sample were very much in favour of having this system of elders to solve conflict. Al-Asher sample is more interesting in that it shows that almost half the sample were not satisfied which means that they would appreciate this sort of system in their settlement. The reason for this is probably a feeling between local residents that they do no get along together and therefore putting responsibility in hands of anyone in particular would not be acceptable to most. Reasons given for their opinions among the Kerdasa sample are; good for preventing conflicts from occurring between community members (10); a system of elders can solve problems better than the state would (5); elders can create harmony between community (2); because there already exists a clear system of norms and codes (2); they have experience in dealing with people; there is public respect for elders; and they have no biases. These responses were given by the Kerdasa sample only, and were intended to gain deeper understanding of how people felt about the system of solving conflicts. This system is a very old cultural system that is slowly dying out. It used to be used even for resolving such subjects as murders and or large crimes, and the state would co-operate and recognise it.

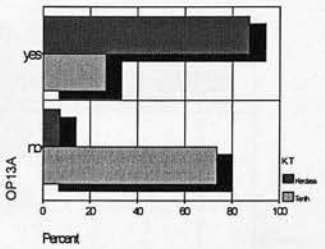


Fig: 8. 66

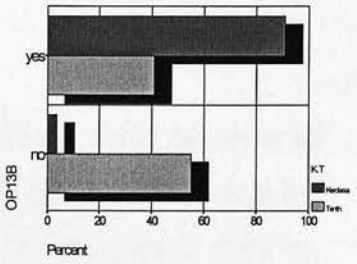


Fig: 8. 67

8.11 Control over Economic Activity and its Built Form

The following variables deal with economic activity variables of control, and are meant to shed light on variables suggested before in Chapter 5. Some variables found in the sustainability section will also apply here. However this section is more dedicated to local control over economic activity.

8.11.1 Need for Transport

This variable sheds light to the extent that it is possible to find ones needs close by. This acts as a variable for the use of transport for needs, and also for the existence of economic activity within the urban form and mixed use. This variable showed statistical significance. **Fig:8.68** shows the responses of the samples. The largest group in Kerdasa sample stated that they thought that they could get most of their needs close by (55%), and almost 30% said they could find all their needs close by. In the case of al-Asher the largest group also stated they could find most needs close by, but almost 25% thought they could only find some needs close. As a whole the figure shows that the Kerdasa sample thought they could find more of their needs closer to them than those in al-Asher.

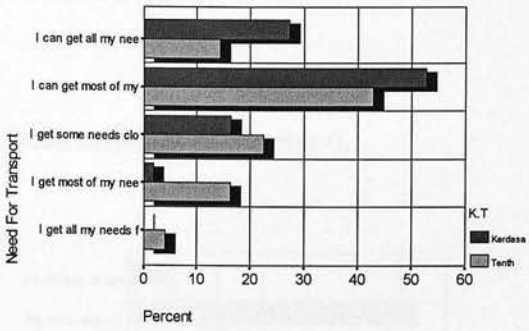


Fig: 8. 68

8.11.2 Existence of Norms Governing Economic Activity

The following two variables identify the samples perception of the existence of norms governing economic activity as seen by the Kerdasa sample and not al-Asher (since there is not a system of norms there). The second objective is, to find out if there is local knowledge of those norms. **Fig:8.69** shows the responses which are a 70% majority acknowledging the existence of norms governing the economic activity. **Fig:8.70** shows that the same number of people thought that those norms were common knowledge among the community. The existence of such norms shows that the community has the ability to take decisions on complex issues such as regulation of different activities. This is probably so because most owners economic activity are centred around local people and are all part of the local system. It general terms, any activity is allowed to open as long as it does not do harm to anyone living around it. An respondent claimed that one activity owner had actually relocated because neighbours were not comfortable. This tends to demonstrate

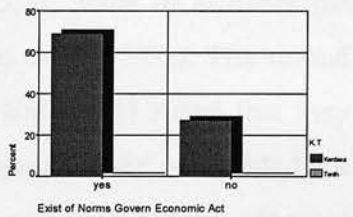


Fig: 8. 69

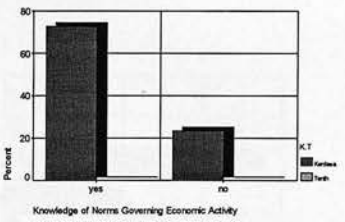


Fig: 8. 70

that potential conflicts can be resolved between the community members even regarding things of importance such as when an individual earns a living.

8.12 Knowledge and Technology

The following variables are aimed to back up those variables of chapter 6.

8.12.1 Dwelling Acquisition

The following two variables aim to discover; first how the dwelling was acquired and built in both samples, secondly the preference of each of the samples on how they would like to acquire their home with hindsight. **Fig:8.71** shows the responses of the two samples to how they acquired and built their dwellings. The most common answer among the Kerdasa sample is that they acquired it by building it with local labour (64%). The second largest response is having the dwelling built through commissioning a contractor (25%), while in al-Asher the majority stated that the dwelling was bought from a previous owner (52%). The second largest group stated they bought it from the state (35%), and (15%) stated that they rented it from another owner. This shows that most of the population did not reside for a long time in the settlement, reinforcing the belief that the apartments are not adequate for extended families.

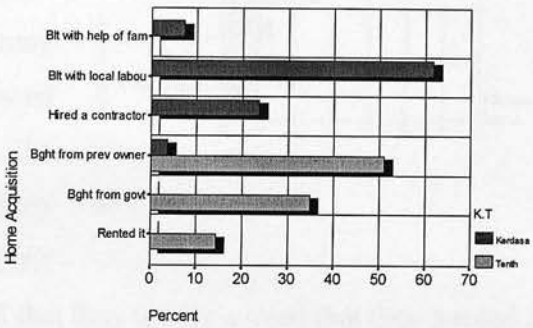


Fig: 8. 71

Fig:8.72 shows the responses of both samples to preference towards the method they would prefer to acquire their home through. The majority of both samples thought they would prefer to acquire their home through personally supervising the building process and hiring labour. In Kerdasa this represents 62%, a majority of the sample. While in al-Asher only 45% preferred to build through personal supervision and hiring of labour. The second largest groups stated they preferred hiring a contractor. However, large numbers also stated they preferred to buy the home from individuals (10%), or to buy from the state(15%). Although both samples did appreciate the ability to supervise the building of their homes, this was not as true in al-Asher as it

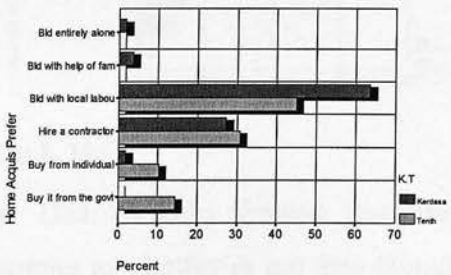


Fig: 8. 72

was in Kerdasa. This demonstrates a culture in Egypt to personally supervise building ones dwelling probably to ensure quality of execution. This seems to be changing according to where the individual lives, encouraging sometimes a preference to buy.

8.12.2 Need for Architect

This variable aims to identify if the samples felt they were lacking knowledge in architectural design, and therefore felt that there was a strong need for an architect. This variable showed statistical significance. **Fig: 8.73** shows the responses of the samples to whether or not they thought an architect was needed to design their dwelling. In Kerdasa the largest group stated that they totally agreed that they needed an architect (42%), while the second largest group (40%) stated that they agreed that there was a need for an architect. While in al-Asher 65% stated that they totally agreed with the need for an architect, and 24% stated that they agreed. Although both samples agree with the need for an architect, there is a stronger feeling that an architect is needed among al-Asher population. An architect is not employed in Kerdasa because the people cannot afford to hire one.

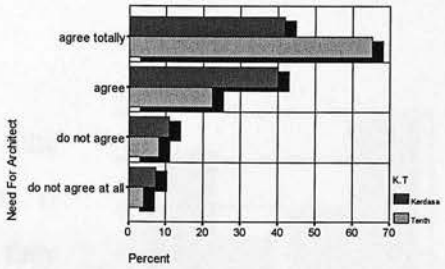


Fig: 8. 73

8.12.3 Need for Civil Engineer

This variable aims to identify if the samples felt they were lacking knowledge of structural design and building execution, and therefore felt that there was a strong need for an a civil engineer. It is important to know that peoples understanding of the civil engineers' role is not only structural design, but also the supervision of the building process according to standards. This variable showed statistical significance. **Fig:8.74** shows the responses of the samples to whether or not they though a civil engineer was needed. In Kerdasa there were two almost equal groups with high frequency in responses. Almost 38% stated that they agreed with the need for a civil engineer, and an almost equal number stated they did not agree with the need for a civil engineer. This shows that in Kerdasa, residents were more comfortable with their ability to provide structural safety than appropriate design, probably because of the existence of local building knowledge. While in al-Asher 70% stated that they totally agreed with the

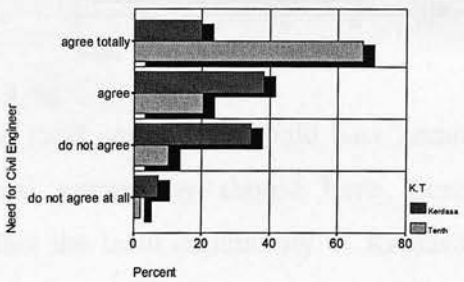


Fig: 8. 74

need for a civil engineer, and 20% stated that they agreed. It seems that in the view of al-Asher sample, a slightly larger percent thought that a civil engineer was vital. The numbers also indicate that the people in Kerdasa have a culture of building on their own and that they did not see strong a need for professionals. This is not as true in al-Asher settlement.

8.12.4 Ability to Maintain Infrastructure

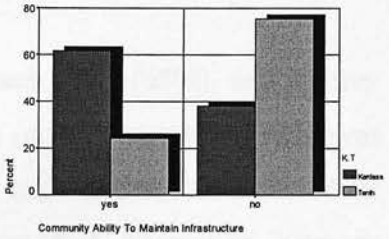


Fig: 8. 75

This variable is intended to explore whether the samples felt they could maintain local infrastructure. If they saw that they could, it would also mean that they felt they had the knowledge and organisational and management capabilities to do so. This variable showed statistical significance. **Fig: 8.75** shows the responses of the samples, which show a much stronger belief that the local community could maintain infrastructure in Kerdasa than in al-Asher sample. This is so because local residents are already undertaking much of the maintenance.

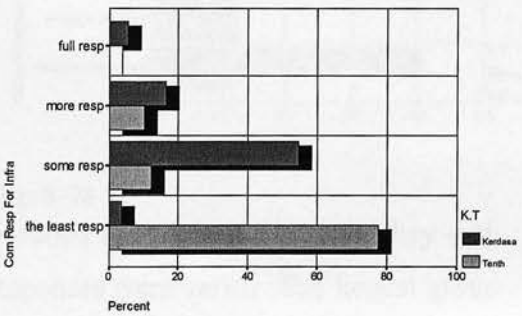


Fig: 8. 76

This variable backs up the previous and is meant to discover the samples opinions on who they thought should have more responsibility over infrastructure, the state or local community. This variable also showed statistical significance. In the case of Kerdasa, the majority of the sample stated that the local community could have some responsibility (56%), and 15% thought the local community should have more responsibility than the state. These results show that the local community in Kerdasa thought they had the ability and knowledge to maintain infrastructure. In al-Asher sample the vast majority stated that the community should have the least responsibility possible (78%).

8.13 Social Variables

The following variables are meant to measure social variables of the chosen samples, and those that demonstrate social cohesion.

8.13.1 Neighbour Relations

The following variable aims to discover the strength of the relations between the neighbours. This variable showed statistical significance. **Fig:8.77** shows the responses of the two samples to how they would describe their relationship with their neighbours. In the Kerdasa sample the most common response was that they conversed and visited each other (65%), and another 20% said they had conversations. While in al-Asher the most common response was that they just said "hello" to their neighbours (55%), and another 20% said their neighbours only looked familiar. These numbers show that interaction between neighbours in Kerdasa is much stronger than in al-Asher.

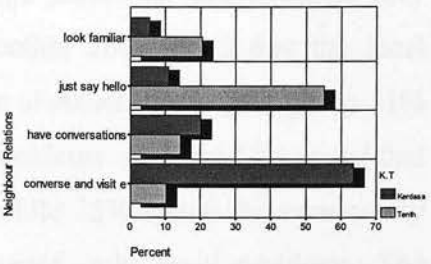


Fig: 8. 77

8.13.2 Scope of Neighbour Relations

This variable is meant to discover the scope of neighbour relations, i.e. how far do neighbours know each other. This variable showed statistical significance. **Fig:8.78** shows the responses of the two samples. In Kerdasa that largest number of respondents stated that they knew all people in the neighbourhood (78%), and 22% that they new only people in the same street. In al-Asher the responses were varied. The largest group stated that they new only neighbours of the street (36%), 19% that they new just immediate neighbours, 20% people in the same street, and 20% people in the neighbourhood. This indicates that the scope for community interaction is higher in Kerdasa.

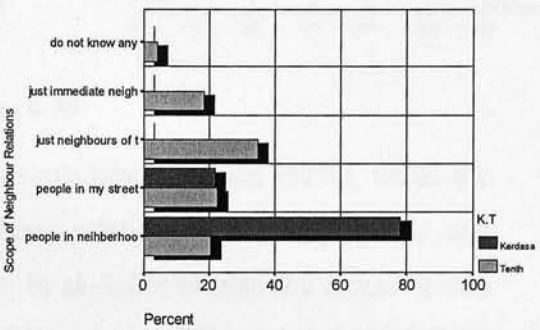


Fig: 8. 78

8.13.3 Community Problem Management

This variable is an attempt to discover to what level the local community interact together to solve local problems. It showed statistical significance. **Fig:8.79** shows the responses to how much the respondents thought the community got together to solve local problems. In Kerdasa the largest group (42%) stated

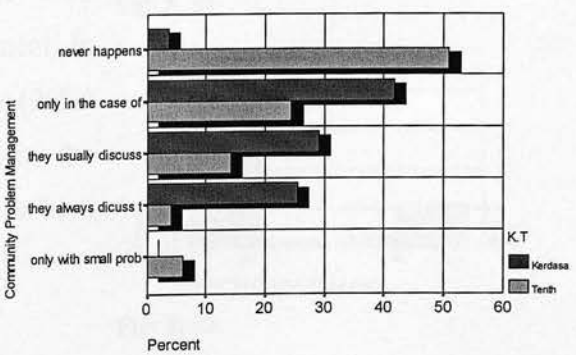


Fig: 8. 79

that neighbours only got together in the case of large problems. Others stated they usually discuss community problems (28%), and another 26% stated that the local community always discussed community problems. In al-Asher, the largest group 51% stated that the local community never discussed their problems. Another 25% stated that they only discussed in the case of large problems, while 15% stated the community usually discussed problems, and 7% that they discussed only small problems. The Kerdasa sample shows a tendency to co-operate together than that of al-Asher.

8.13.4 Quality of Neighbour Relations

This variable is intended to measure the sample responses to their perception of the quality of the relations between the neighbours. This variable showed statistical significance. **Fig:8.80** shows the responses of the samples to their view on the quality of local neighbour relations. The largest group in Kerdasa stated that they thought the neighbour relations are good (52%), while the second largest group (28%)stated that neighbour relations were very good, and another(18%) thought the relations were average. In al-Asher sample the largest group thought that neighbour relations were average (52%), another 20% stated that relations were good, 8% stated they were bad, and another 8% stated they were very bad. In all the perception of the relationship between the community members in Kerdasa is higher.

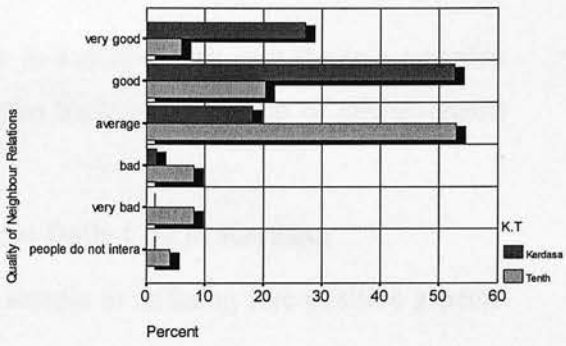


Fig: 8. 80

8.13.5 Existence of the Extended Family

This variable aims to discover the prevalence of extended families in both settlements. This variable shows statistical significance. **Fig:8.81** shows the responses of the samples to whether there were many extended families living in the settlement. In Kerdasa, an overwhelming number of people (96%) said there were extended families living in the settlement. In al-Asher there did not seem to be a significant number.

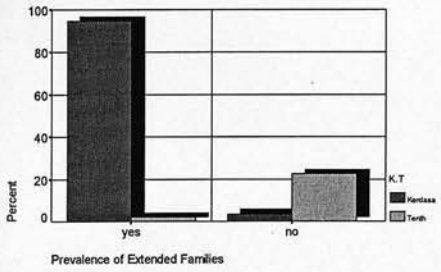


Fig: 8. 81

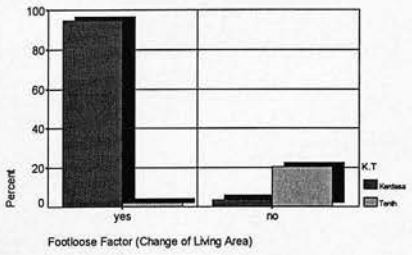


Fig: 8. 82

This variable backs up the previous. It identifies whether each respondent's family had always lived in the settlement. This variable also showed statistical significance. **Fig:8.82** shows the responses of the samples which are almost identical to the previous variable. Both these variables show how generations upon generation try to live in the same place in Kerdasa and the strength of family ties. This promotes social cohesion between community members and improves their ability to co-operate together and become united.

8.14 Open-ended Questions

The following variables are intended to explore in a deeper way into the two samples and how they think of their built form. They also backup the choice of closed-ended questions and reinforce them.

8.14.1 Five Positive and Negative Aspects about Daily Life in Kerdasa

The following are the responses of the Kerdasa sample to defining five positive aspects contributing to daily life in the settlement:-

Group $OP1A Category label	Code	Count	Pct of Responses	Pct of Cases
provision of a good new sewage system	1	7	3.3	13.2
provision of new garbage collection sys	2	1	.5	1.9
water quality	3	2	.9	3.8
new telephone system	4	1	.5	1.9
good number of mosques	5	7	3.3	13.2
availability of goods	6	2	.9	3.8
closeness to country side	7	2	.9	3.8
good neighbours	8	2	.9	3.8
unity of culture and cultural norms	9	10	4.7	18.9
community co-operation	10	12	5.6	22.6
tranquillity	11	23	10.7	43.4
quality of community members	12	5	2.3	9.4
living with family/ relatives & friends	13	23	10.7	43.4
provision of services and infrastructure	14	16	7.4	30.2
exist. of green areas	15	14	6.5	26.4
no pollution	16	7	3.3	13.2
closeness to city	17	4	1.9	7.5
social and family relations	18	22	10.2	41.5
private property existence	19	2	.9	3.8
commercial acty (Monday market & shops)	20	2	.9	3.8
tourist street as area for recreation	21	4	1.9	7.5
country culture and ethics	22	1	.5	1.9
transport ease	23	11	5.1	20.8
provision of youth centre	24	10	4.7	18.9
settl linked to more than one main road	25	2	.9	3.8
existence of cemetery	26	1	.5	1.9
cleanliness	28	2	.9	3.8
exist of schools for all ages	29	4	1.9	7.5
exist of some good architecture	30	1	.5	1.9
stability in life	31	1	.5	1.9
avail of employ without govt intervention	32	1	.5	1.9
not a crowded place	33	2	.9	3.8
existence of coffee shops	34	1	.5	1.9
provision of electricity	35	1	.5	1.9
having my own business	36	4	1.9	7.5
living & working in the same area	37	2	.9	3.8
living where i was born	38	2	.9	3.8
visits bet friends & family	39	1	.5	1.9
Total responses		215	100.0	405.7
51 missing cases; 53 valid cases				

Fig: 8. 83 Five positive aspects about daily life in Kerdasa.

Fig:8.83 shows the responses of the Kerdasa sample. The three largest responses given are tranquillity, living with family & relatives & friends, and social and family relations. It is notable that two of these responses related to social variables. Other strong responses are unity of cultural norms; community co-operation; provision of services and infrastructure; existence of green areas; transport ease; provision of youth centre; and good number of mosques. Again social values appear often. We should remember that the responses of the samples would differ according to the individual and their circumstances.

The following are the five negative aspects of daily life as given by the Kerdasa sample;

Group $OP1B

Category label	Code	Count	Pct of Responses	Pct of Cases
water quality	1	5	3.3	10.6
lack of telephones	2	3	2.0	6.4
lack of employment	3	5	3.3	10.6
lack of gas	4	3	2.0	6.4
higher priced goods than outside	5	1	.7	2.1
narrow street width	6	12	7.9	25.5
no street paving or asphalt	7	15	9.9	31.9
lack of sports facilities	8	1	.7	2.1
no public gardens	9	5	3.3	10.6
water cuts and week flow	10	3	2.0	6.4
work outside of settlement	11	1	.7	2.1
transport outside of settlement	12	7	4.6	14.9
some areas crowded	13	2	1.3	4.3
new immigrants in settlement with a differ	14	2	1.3	4.3
existence of some illiteracy	15	4	2.6	8.5
some bad social actions	16	9	5.9	19.1
noisy	17	3	2.0	6.4
exist of some uncovered streams (insects	18	6	3.9	12.8
youth centre not well equipped & maint	19	3	2.0	6.4
no specific loc to throw garbage	20	3	2.0	6.4
bad elect network	22	4	2.6	8.5
some infra not good or sufficient	23	7	4.6	14.9
inc of govt intervention in town	24	1	.7	2.1
low living and income levels	25	1	.7	2.1
homes are small & close together	26	1	.7	2.1
no building regulation	27	6	3.9	12.8
exist of noisy workshops in some areas	29	1	.7	2.1
no organisation in markets places	30	1	.7	2.1
lack of recreational act eg cinema	31	5	3.3	10.6
no street lighting	32	3	2.0	6.4
lack of health care	33	5	3.3	10.6
no internal transport	34	1	.7	2.1
various	35	2	1.3	4.3
lack of cleanliness	36	7	4.6	14.9
week education system	37	2	1.3	4.3
actions of young people	38	1	.7	2.1
no where for children to play	39	1	.7	2.1
bad transport system	40	3	2.0	6.4
exist of pollution	41	1	.7	2.1
cultural level of comm low	42	1	.7	2.1
random quality of buildings	43	1	.7	2.1
some small factories bet residential	45	1	.7	2.1
govt not showing interest in area	46	2	1.3	4.3
depletion of green areas	47	1	.7	2.1

Fig: 8. 84 Five negative aspects of daily life in the settlement

The most common responses to the negative aspects of daily life in Kerdasa were narrow street widths and lack of street paving. Other negative responses commonly reported are: existence of some bad social habits, existence of uncovered streams which

are believed to increase insects and disease; some of the infrastructure not of good quality or insufficient; no building regulations; lack of cleanliness; lack or recreational activities; and a lack of healthcare. The negative aspects of daily life in the settlement seem to be largely physical rather subjective aspects reported in the positive list.

8.14.2 Five Positive and Negative Aspects about the Dwelling in Kerdasa

The following are the responses of what the five positive aspects the respondents saw in their dwelling.

Group $OP2A

Category label	Code	Count	Pct of Responses	Pct of Cases
home orientation (north / south)	1	2	1.1	4.2
structure system	2	9	4.9	18.8
ease of buying and selling in area	3	1	.5	2.1
existence of shops to let out providing	4	1	.5	2.1
location	5	17	9.3	35.4
existence of balconies	6	1	.5	2.1
private ownership	7	16	8.8	33.3
existence of green area	8	7	3.8	14.6
ventilation	9	13	7.1	27.1
low level of dampness	10	1	.5	2.1
tranquillity of area	11	10	5.5	20.8
spatial distribution	12	14	7.7	29.2
existence of infrastructure(elec., water)	13	10	5.5	20.8
living with family & friends	14	11	6.0	22.9
building entrance	15	4	2.2	8.3
top of building well aerated	16	1	.5	2.1
privacy	17	3	1.6	6.3
adequate area	18	21	11.5	43.8
style and appearance	19	4	2.2	8.3
home on two streets	20	1	.5	2.1
good light penetration & ventilation	21	6	3.3	12.5
interior finishing complete	22	2	1.1	4.2
area for rearing birds	23	1	.5	2.1
neighbour relations	24	4	2.2	8.3
close to transport	25	3	1.6	6.3
close to country side	26	1	.5	2.1
simple & self-sufficient	27	3	1.6	6.3
home on a wide street	28	1	.5	2.1
home on more than street	29	2	1.1	4.2
existence of telephone	30	1	.5	2.1
external staircase	31	1	.5	2.1
close to shops	32	1	.5	2.1
able to design bld to wishes	33	1	.5	2.1
ability to inc. floors	34	1	.5	2.1
i have my own room	35	2	1.1	4.2
build high from ground	36	2	1.1	4.2
new building	37	1	.5	2.1
plentiful no of rooms	38	1	.5	2.1
good height	39	1	.5	2.1
Total responses		182	100.0	379.2
	56 missing cases;		48 valid cases	

Fig: 8. 85 Five positive aspects of dwelling

The most common response by the sample was that the area of the dwelling was appropriate. This reinforces that they way the dwellings are built gradually and organically is a process that can be adapted to the increase in the members of the family and its needs. The second most common response is the location of the dwelling and private ownership. Private ownership is a very important aspect to the Kerdasa sample that seems to give security to the population. Other commonly stated qualities of the

home are; spatial distribution, living with family and friends, existence of infrastructure, ventilation and light penetration, and structure system that enables greater extensions. It is notable that one of the commonly mentioned aspects is social (living with family and friends) which although it is not a physical aspect of the home was mentioned showing how important social factors are to the sample.

The following are the negative aspects of the dwelling:

group $op2b

category label	code	count	pct of responses	pct of cases
structure system (wall bearing)	2	7	6.7	16.7
building process incomplete	3	5	4.8	11.9
close to stream attract insects	4	2	1.9	4.8
location	5	3	2.9	7.1
insufficiency of area	6	7	6.7	16.7
staircase not in approp. loc.	7	6	5.8	14.3
inexistence of green area	8	8	7.7	19.0
close to gas storage area	11	1	1.0	2.4
non regulation of form & spatial distribution	12	17	16.3	40.5
on a narrow street	13	3	2.9	7.1
int sewage system not good	14	2	1.9	4.8
internal finishing not good	15	6	5.8	14.3
inability to inc no of floors	16	2	1.9	4.8
no place to raise birds	17	1	1.0	2.4
exist of one brick walls	18	1	1.0	2.4
dist from settl centre	19	1	1.0	2.4
home in a dead end st	20	1	1.0	2.4
grnd fl isn't high enough from st	21	2	1.9	4.8
home has small entrance	22	2	1.9	4.8
small facade for house	23	1	1.0	2.4
builds are close together	24	3	2.9	7.1
far from family & friends	25	1	1.0	2.4
no balcony	26	1	1.0	2.4
no telephone	27	2	1.9	4.8
soil settlement	28	1	1.0	2.4
week water supply and cuts	29	4	3.8	9.5
electricity cuts	30	2	1.9	4.8
close to a workshop	31	1	1.0	2.4
water cuts, shortage & impurity	32	4	3.8	9.5
hot in summer	33	1	1.0	2.4
small staircase	34	1	1.0	2.4
noisy neighbours	35	1	1.0	2.4
permission to inc floors	36	1	1.0	2.4
house appear not good	37	1	1.0	2.4
house needs some maint	38	1	1.0	2.4
no architect designed it	39	1	1.0	2.4
total responses		104	100.0	247.6
62 missing cases;		42 valid cases		

Fig: 8. 86 Five negative aspects of the dwelling

The most common response among the sample is non-regulation of the dwelling and bad spatial distribution of the dwelling. The reasons for this may be because of the association of organic urban form with a low living standard. This opposes the higher level of satisfaction found in Kerdasa as determined by closed-ended questions. Other strong responses are the non existence of a green area, insufficiency of area, structure system, and quality of internal finishing. These are among the negative aspects concerning the dwelling most commonly stated. The location of the staircase within the dwelling was also mentioned as a negative quality. This is true because the dwelling is

first planned out usually by not taking into account the vertical extension and how it is going to be made.

8.14.3 Five Positive and Negative Aspects of the Neighbourhood in Kerdasa

Group $OP3A

Category label	Code	Count	Pct of Responses	Pct of Cases
neighbours and relatives relationship	1	26	21.0	61.9
availability of mosques	2	7	5.6	16.7
services availability	3	2	1.6	4.8
liveliness of area	4	1	.8	2.4
existence of free occasions hall	5	1	.8	2.4
good sewage system	6	2	1.6	4.8
street lighting	7	1	.8	2.4
no pot holes in street	8	2	1.6	4.8
not a noisy and buisy area	9	2	1.6	4.8
safety from vehicle traffic	10	1	.8	2.4
location	11	1	.8	2.4
neighbour co-operation	12	15	12.1	35.7
street location	13	1	.8	2.4
street close to commercial area	14	5	4.0	11.9
good street width	15	10	8.1	23.8
safety in street	16	2	1.6	4.8
tranquillity	17	7	5.6	16.7
good street area	18	2	1.6	4.8
cleanliness	19	4	3.2	9.5
avail of needs (shops)	20	3	2.4	7.1
little pollution	21	2	1.6	4.8
approp. building heights	22	2	1.6	4.8
avail of infrastructure	23	4	3.2	9.5
no outside residents	24	1	.8	2.4
good ventilation of street	25	1	.8	2.4
exist of large green areas close by	26	3	2.4	7.1
close to transport (commuters)	27	2	1.6	4.8
harmonious building styles	28	2	1.6	4.8
visits between neighbours	29	1	.8	2.4
tree planting in street	30	2	1.6	4.8
street buildings are new	31	1	.8	2.4
st not occup (eg merchants stalk)	32	1	.8	2.4
exist side streets improving ventilation	33	1	.8	2.4
close to centre of town	34	1	.8	2.4
street safety	35	1	.8	2.4
comes from a main street	36	1	.8	2.4
houses all privately owned	37	1	.8	2.4
low population density	38	1	.8	2.4
street appearance good	39	1	.8	2.4
Total responses		124	100.0	295.2

62 missing cases; 42 valid cases

Fig: 8. 87 Positive aspects of the neighbourhood

Fig;8.87 shows the responses of the sample to the five positive aspects of their neighbourhood. The most frequent response is neighbour and relative relationship. This reflects that families occupy a particular location in the urban environment and that social values are important to them. Neighbour co-operation is the second most frequent response reinforcing the importance of social values. Other frequent responses are availability of mosque, good street width, tranquillity, close to commercial areas, availability of needs, and availability of infrastructure.

Category label	Code	Pct of Count	Pct of Responses	Cases
insufficient external transport	1	2	1.8	5.1
some stream bridges are unsafe	2	1	.9	2.6
internal streams are not covered	3	4	3.7	10.3
people prying into others business	4	6	5.5	15.4
no street paving or asphalting	5	15	13.8	38.5
no trees in streets	6	4	3.7	10.3
no commercial shops	7	1	.9	2.6
closeness to stream	8	1	.9	2.6
random quality of building and street	9	6	5.5	15.4
no sports center	10	1	.9	2.6
narrow street width	11	12	11.0	30.8
lighting poles randomly positioned	12	1	.9	2.6
no green area in street	13	2	1.8	5.1
closeness to workshops	15	2	1.8	5.1
noisy area	16	5	4.6	12.8
exist pullusive workshops	17	1	.9	2.6
insufficient street lighting	18	5	4.6	12.8
exist of high voltage elect cables	19	1	.9	2.6
distance from centre of settlement	20	2	1.8	5.1
a little crowded	21	1	.9	2.6
dist from transport & commuter	22	1	.9	2.6
no near by mosque	23	2	1.8	5.1
illiteracy and primitive thinking in some	24	1	.9	2.6
envy bet some people	25	2	1.8	5.1
neighbours are not good	26	2	1.8	5.1
street not clean	27	5	4.6	12.8
dead end street	28	2	1.8	5.1
elect cuts, & bad system	29	5	4.6	12.8
no where in str for raising animals	30	1	.9	2.6
neighbours do not interact	31	1	.9	2.6
no public telephone	32	2	1.8	5.1
exist of insects and flies	33	1	.9	2.6
exist of resid from outside area	36	1	.9	2.6
lots of noisy children	37	1	.9	2.6
lots of donkey cars pass	38	1	.9	2.6
bad social actions eg bad language	39	1	.9	2.6
street appearance not good	40	2	1.8	5.1
a lot of buildings	41	1	.9	2.6
problems bet some neighbours	42	1	.9	2.6
some build not of good appearance	43	2	1.8	5.1
no street committee	44	1	.9	2.6
Total responses		109	100.0	279.5

Fig: 8. 88 Negative aspects of neighbourhood

Fig:8.88 shows the responses of the Kerdasa sample to the five negative aspects of their neighbourhood. The most common response was that there was not street paving or asphalt, and the second most common response is that street widths are narrow. Both relate to the quality of the street, which is unsatisfactory to many. Other common responses are people prying into others business, random quality of buildings (not regulated), noise, insufficient street lighting, lack of cleanliness, electricity shortages, internal settlement streams not covered (increasing insects and desease), and lack of tree planting. The responses do not necessarily mean that there is deficiency in these aspects but rather that these are important to the community.

8.14.4 Five Positive and Negative Aspects about Daily Life in Al-Asher

Category label	Code	Pct of Count	Pct of Responses	Cases
trans ease	1	24	24.0	61.5
tree planting	2	1	1.0	2.6
architectural design	3	1	1.0	2.6
dist bet buildings	4	2	2.0	5.1
privacy	5	1	1.0	2.6
inc in no of green areas	6	1	1.0	2.6
good design of area	7	1	1.0	2.6
exist of a sports centre	8	2	2.0	5.1
exist of commercial centre	9	6	6.0	15.4
tranquillity	10	16	16.0	41.0
clean air	11	8	8.0	20.5
cleanliness	12	1	1.0	2.6
simplicity of place people	13	1	1.0	2.6
exist of daily needs	14	1	1.0	2.6
apartment prices are cheap	15	1	1.0	2.6
no elect cuts	16	1	1.0	2.6
exist of daily needs	17	2	2.0	5.1
quality of infrastructure	18	2	2.0	5.1
good oppert for manual work/craft	19	1	1.0	2.6
street width are good	20	3	3.0	7.7
good relations bet youths	21	1	1.0	2.6
living with friends	22	2	2.0	5.1
availability of services	23	6	6.0	15.4
people will accept an outsider	24	1	1.0	2.6
availability of infrastructure	25	2	2.0	5.1
exist of coffee shops	26	2	2.0	5.1
no baltaga	27	1	1.0	2.6
provision local schools	28	1	1.0	2.6
good relations betw neighbours	29	2	2.0	5.1
planning is good	30	2	2.0	5.1
main streets are well maintained	31	1	1.0	2.6
good relations bet people	32	1	1.0	2.6
close to city	33	1	1.0	2.6
close to work	34	1	1.0	2.6
Total responses		100	100.0	256.4

Fig: 8. 89 Positive qualities of settlement

It is notable that there are fewer responses to open-ended questions in al-Asher than there are in Kerdasa. This is because there is a stronger willingness among them to be helpful than there was in al-Asher. **Fig: 8.89** shows the responses of al-Asher sample to the five positive aspects of their settlement. The most frequent response was because of transport ease. This is because many people moved to the area as a result of its vicinity to their employment. The second most frequent response is because of tranquillity, which is due to the fact that the settlement is on the outskirts of Cairo, and in comparison it is very tranquil. Other responses were clean air, existence of commercial area, street width, and availability of services. In comparison to Kerdasa, social factors are not strong.

street asphalt	1	3	2.1	6.4
closeness to commercial area	2	1	.7	2.1
lack of cleanliness	3	15	10.3	31.9
noise pollution	4	2	1.4	4.3
pollution	5	1	.7	2.1
buildings are not organised	6	2	1.4	4.3
streets are not maintained	7	1	.7	2.1
differ social backgds & behaviour of people	8	7	4.8	14.9
coffee shops found in resid area	9	1	.7	2.1
lack of security & theft	10	7	4.8	14.9
inc in price of apartments	11	1	.7	2.1
unemployment	12	1	.7	2.1
prices of goods	13	10	6.8	21.3
lighting	14	5	3.4	10.6
constant digging & burying in str	15	2	1.4	4.3
youth centre not run well	16	1	.7	2.1
no libraries	17	1	.7	2.1
no sign posts	18	1	.7	2.1
trans not good to all areas	19	3	2.1	6.4
no good bakeries	20	3	2.1	6.4
people are not cohesive	21	9	6.2	19.1
apartments are small	22	7	4.8	14.9
prefab buildings are not good	23	1	.7	2.1
water cuts freq	24	4	2.7	8.5
dist from city centre	25	2	1.4	4.3
streets are not clean	26	1	.7	2.1
overpopulation & crowd	27	2	1.4	4.3
exist of "baltaga"	28	2	1.4	4.3
local govt not good	29	2	1.4	4.3
expensive elect charges	30	1	.7	2.1
no ambulance service close by	31	2	1.4	4.3
lack of recreational activities	32	5	3.4	10.6
no local fire department	33	1	.7	2.1
social interaction weak	34	1	.7	2.1
no community co-operation	35	4	2.7	8.5
apprts & resid bldgs not good	36	2	1.4	4.3
people do not look out for each other	37	1	.7	2.1
grnd floor level to small	38	1	.7	2.1
govt prevention of blg inc	39	1	.7	2.1
incr in renting prices	40	1	.7	2.1
lack of street lighting	41	1	.7	2.1
lack of health service provisions	42	5	3.4	10.6
problems bet members of comm	43	3	2.1	6.4
no employment in area	44	1	.7	2.1
drugs problems	45	1	.7	2.1
shops mixed with residential	46	1	.7	2.1
community is irresponsible	47	1	.7	2.1
lack of daily needs	48	2	1.4	4.3
sewage pipes are not good	49	1	.7	2.1
exist of stray dogs	50	1	.7	2.1
no good bread	51	1	.7	2.1
people prying into others business	52	1	.7	2.1
people fighting in the street	53	2	1.4	4.3
blg appear not good & boring	54	2	1.4	4.3
lack of social interaction	55	1	.7	2.1
cold whether in winter	56	1	.7	2.1
lack of services	57	1	.7	2.1
exist of random blg	58	1	.7	2.1
opening workshops in resid areas	59	1	.7	2.1
Total responses		146	100.0	310.6

Fig: 8. 90 Negative aspects of settlement

Fig:8.90 shows the responses of al-Asher sample for five negative aspects of their settlement. The most common response was that there was a lack of cleanliness in the settlement. Very common responses included the higher prices of goods, and that the population was not cohesive. Other common responses are; different social backgrounds between people, theft and lack of security, small size of apartments, lack of lighting, lack of recreational facilities, lack of health service, and no community co-operation.

Responses about the lack of community cohesion and weak relations indicate the social qualities of the population or community.

8.14.5 Five Positive and Negative aspects about the Dwelling in Al-Asher

Category label	Code	Count	Pct of Responses	Pct of Cases
Adequate area	1	9	14.3	30.0
spatial distribution	2	2	3.2	6.7
electricity network	3	1	1.6	3.3
telephone	4	1	1.6	3.3
size of rooms	5	2	3.2	6.7
exist of balconies	6	1	1.6	3.3
apart on more than one facade	7	2	3.2	6.7
gd facade finishing	8	1	1.6	3.3
ventilation	9	5	7.9	16.7
distances bet buildings	10	1	1.6	3.3
orientation N/S E/W	12	4	6.3	13.3
price of apartment	13	2	3.2	6.7
everyone minds his own business	14	2	3.2	6.7
adequately furnished	15	2	3.2	6.7
location	16	1	1.6	3.3
tranquil area	17	3	4.8	10.0
neighbours are good	18	3	4.8	10.0
living with ones family	19	3	4.8	10.0
close to work	20	1	1.6	3.3
flat in last floor	21	1	1.6	3.3
possibility of incr area	22	1	1.6	3.3
ability of pigeon rearing on blg	23	1	1.6	3.3
exist of garden for people to use	24	1	1.6	3.3
friends in same blg	25	1	1.6	3.3
structure system & concrete good	26	1	1.6	3.3
being relaxed in ones home	27	1	1.6	3.3
cleanliness blg	28	1	1.6	3.3
safety in blg	29	1	1.6	3.3
clean air	30	1	1.6	3.3
int infrast good	31	1	1.6	3.3
exist of needs	32	1	1.6	3.3
int sewage syst good	33	1	1.6	3.3
privacy existent	34	1	1.6	3.3
penetration of natural light	35	1	1.6	3.3
entrance of sunlight into flat	36	1	1.6	3.3
private ownership	37	1	1.6	3.3
Total responses		63	100.0	210.0
74 missing cases; 30 valid cases				

Fig: 8. 91 Positive aspects of the dwelling

Fig:8.91 shows the responses of al-Asher sample to what were the five positive aspects of their dwelling. The most frequent response was that the dwelling was of adequate area. This shows that area is an important issue to the respondents of the sample. It does not necessarily mean that original apartment units were of adequate area since many apartments were extended or even conjoined with another to increase the floor area. Very common responses also included good ventilation, and orientation of apartment in reference to the sun. Other responses were spatial distribution, size of rooms, apartment taking more than one facade, price, furnishing, and people keeping to themselves. The last response although shows a lack of interaction between population, and that some prefer it so.

Group $O2B

Category label	Code	Count	Pct of Responses	Pct of Cases
bad sewage system	1	8	8.9	21.6
buildings are prefab	2	1	1.1	2.7
bad internal finishing	3	6	6.7	16.2
structural problems	4	2	2.2	5.4
bad relation bet neighbours	5	5	5.6	13.5
noisy	6	1	1.1	2.7
build not well maintained	7	3	3.3	8.1
foundations are not good	8	1	1.1	2.7
design of facade	9	1	1.1	2.7
prefab build problems	10	1	1.1	2.7
lack of family cohesion bec of work	11	1	1.1	2.7
different social backgrounds of neighbours	12	1	1.1	2.7
small rooms	13	5	5.6	13.5
lack of resources	14	1	1.1	2.7
small area	15	16	17.8	43.2
random increases in blgs	16	1	1.1	2.7
humidity & dampness	17	1	1.1	2.7
appart infr & finishing below standard	18	4	4.4	10.8
ceiling height is small	19	1	1.1	2.7
appearance of blg not good	20	2	2.2	5.4
no telephone	21	1	1.1	2.7
no owner union in blg	22	1	1.1	2.7
privacy lack	23	1	1.1	2.7
small balconies	24	3	3.3	8.1
dirty staircase	25	1	1.1	2.7
some int maintenance needed	26	1	1.1	2.7
closeness of bldgs for privacy	27	2	2.2	5.4
no lighting in staircase	28	1	1.1	2.7
no lift	29	3	3.3	8.1
exist of uneducated neighbours	30	1	1.1	2.7
orientation not good N/S - E/W	31	1	1.1	2.7
last floor, long walk up	32	3	3.3	8.1
no land ownership for appart owners	33	1	1.1	2.7
prevention of blg inc	35	1	1.1	2.7
spatial distribution	36	2	2.2	5.4
land / building distribution (urban plan)	37	1	1.1	2.7
hot in summer	38	2	2.2	5.4
cold in winter	39	1	1.1	2.7
Total responses		90	100.0	243.2

67 missing cases; 37 valid cases

Fig: 8. 92 Negative aspects of dwelling

Fig: 8.92 shows the responses of al-Asher sample to the five negative aspects of their dwelling. The most common response was the small area of the apartment, which is understandable. Other very common responses are bad waste water system and bad internal finishing. Also bad relations with neighbours, small rooms, band quality in execution, no lift, small balconies, lack of privacy because of close buildings, and small rooms. From the responses it is noticed that much of the negative qualities have to do with an inferior quality of execution and maybe quality of materials. Local community relationships between neighbours are strongly contrasting between the two samples.

8.14.6 Five Positive and Negative Aspects of the Neighbourhood in al-Asher

Group $O3A Category label	Code	Count	Pct of Responses	Pct of Cases
tree planting	1	2	4.7	10.0
near commercial area	2	1	2.3	5.0
distances bet buildings	3	2	4.7	10.0
architectural design	4	1	2.3	5.0
st lighting	5	1	2.3	5.0
near commercial area	6	2	4.7	10.0
exist of green areas	7	7	16.3	35.0
street width	9	10	23.3	50.0
street asphalt	10	2	4.7	10.0
street clean	11	1	2.3	5.0
layout & design	12	1	2.3	5.0
tranquillity	14	2	4.7	10.0
cooperation of resid in st cleaning	15	1	2.3	5.0
living close to friends	16	1	2.3	5.0
good planning	17	1	2.3	5.0
main street	18	2	4.7	10.0
existence of parking areas	19	1	2.3	5.0
closeness to mosque	20	1	2.3	5.0
good st paving	21	1	2.3	5.0
close to transport	22	1	2.3	5.0
close to services	23	1	2.3	5.0
exist of shops	24	1	2.3	5.0
Total responses		43	100.0	215.0

84 missing cases; 20 valid cases

Fig: 8. 93 Positive aspects of neighbourhood

Fig:8.93 shows the responses of al-Asher sample to the five positive aspects of their neighbourhood. The most common response was the existence of green areas. Existence of green areas refers to owners of the ground floor taking the piece of land in front of their apartments and planting them. The second most common response was street width. Other common responses were; tree planting, distances between buildings, near commercial areas, street asphalt, tranquillity, and main street.

Group $O3B

Category label	Code	Pct of Count	Pct of Responses	Cases
str asphalt & paving not good	1	14	15.6	37.8
lack of cleanliness	2	16	17.8	43.2
noise bec of coffee shops	3	1	1.1	2.7
street lighting	4	13	14.4	35.1
inc of unorganised buildings	5	4	4.4	10.8
no build, owner unions	7	1	1.1	2.7
lots of garbage dumps	9	1	1.1	2.7
buildings are not regulated	10	2	2.2	5.4
shops opening in resid areas	11	3	3.3	8.1
workshops open in resid area	12	4	4.4	10.8
no garbage cans in str	13	1	1.1	2.7
street not safe	14	2	2.2	5.4
street width	15	3	3.3	8.1
no cleaning men	16	1	1.1	2.7
comm does not cooperate	17	1	1.1	2.7
lack of green areas	18	3	3.3	8.1
difficulty of parking	19	1	1.1	2.7
exist of coffee shops	20	1	1.1	2.7
some problems bet neighbours	21	1	1.1	2.7
lack of privacy bet blgs	22	1	1.1	2.7
lack of maintenance from govt	23	1	1.1	2.7
exist of "baltaga	24	1	1.1	2.7
no traffic calming measures	25	1	1.1	2.7
no tree planting	26	1	1.1	2.7
lack of security	27	1	1.1	2.7
sewage network exceeds str level	28	1	1.1	2.7
dump build materials in str	29	1	1.1	2.7
sewage system not good	30	2	2.2	5.4
noise pollution	31	1	1.1	2.7
garbage in the street	32	1	1.1	2.7
lack of trees	33	1	1.1	2.7
no shade in the street	34	1	1.1	2.7
exist of passing lorry trucks	35	1	1.1	2.7
noise from main st	36	1	1.1	2.7
constant digging up streets	37	1	1.1	2.7
Total responses		90	100.0	243.2

67 missing cases; 37 valid cases

Fig: 8. 94 Negative aspects of neighbourhood

Fig:8.94 shows the responses to the five negative aspects of the neighbourhood in al-Asher sample. The most common response was the lack of cleanliness. Other very common responses were inadequacy of street asphalt and paving, and the lack of street lighting. Also recorded are opening of workshops in residential areas, increase of unregulated buildings, shops opening in residential areas, lack of safety, street width, and bad sewage system. Most of these aspects relate to the quality of the physical surroundings and not social values.

8.14.7 Sample Suggestions in Kerdasa and al-Asher

The following are the responses of the samples on what should be done to improve their environment in both Kerdasa and al-Asher. These are the responses of the Kerdasa sample;

Group $OP16

Category label	Pct of Code	Pct of Count	Responses	Cases
inc tree planting & greening	1	13	8.3	25.0
providing street pavements	2	6	3.8	11.5
asphalt of roads	3	20	12.8	38.5
street widening	4	12	7.7	23.1
regulation of building process	5	10	6.4	19.2
covering settlement streams	6	4	2.6	7.7
providing street lighting	7	6	3.8	11.5
providing of public gardens	8	5	3.2	9.6
restricting max no of floors	9	2	1.3	3.8
harmonising build colours in each area	10	1	.6	1.9
com contrib to maintain infrastructure	11	1	.6	1.9
create comm aware on how to maintain envi	12	1	.6	1.9
improving aesthetic quality of built env	13	2	1.3	3.8
making a better unified electricity net	14	4	2.6	7.7
moving pollusive workshops	15	1	.6	1.9
making a street cleaning system	16	7	4.5	13.5
changing the elect network	17	8	5.1	15.4
finishing of buildings	18	2	1.3	3.8
finishing of facades	19	1	.6	1.9
improving infrastructure	20	7	4.5	13.5
inc no of bus & improv transport	21	5	3.2	9.6
improving water network and system	22	9	5.8	17.3
providing telephone system	23	5	3.2	9.6
improving the town entrance	24	1	.6	1.9
puting litter baskets in streets	25	1	.6	1.9
provision of health centre (hosp...etc)	26	1	.6	1.9
permitting the building process by govt	27	3	1.9	5.8
preventing large building heights	29	1	.6	1.9
increase & improve recr facilities	30	3	1.9	5.8
ident build boundry of town	31	1	.6	1.9
use of column & beam syst	32	1	.6	1.9
use of engineer for supervision	33	2	1.3	3.8
allow for dist bet buildings	34	1	.6	1.9
govt supervision building process	35	1	.6	1.9
having an elected rep. of each neigh	36	1	.6	1.9
com should care for str cleaning	37	1	.6	1.9
com have legal power over domain	38	1	.6	1.9
give more power to local govt	39	1	.6	1.9
maintaining old buildings	40	1	.6	1.9
improving street & town appearance	41	2	1.3	3.8
regulation of buildgs & streets	42	1	.6	1.9
Total responses		156	100.0	300.0

52 missing cases; 52 valid cases

Fig: 8. 95 Suggestions for improving the environment of respondents in Kerdasa

Fig:8.95 shows the suggestions of the Kerdasa sample to improving their environments. The most common response was that they needed street paving and asphalt. Other very common responses include; increasing tree planting and greening, widening of streets, increased regulation of the building process, and improving the water network and system. Other commonly mentioned are providing street lighting, providing public gardens, providing a street cleaning system, changing electricity network to a ground system, providing telephone lines, improvement of transport system, and general improvement of infrastructure. Most suggestions appear to be directed at the state in

order to improve the quality of the services provided for the local community, which in their view should be upgraded.

Group $O16

Category label	Code	Count	Pct of Responses	Pct of Cases
improving str asphalt & paving	1	18	14.1	46.2
incr cleanliness	2	16	12.5	41.0
penalty against garbage dumping	3	1	.8	2.6
monitoring of infrastructure	4	1	.8	2.6
monitoring build for struct failures	5	1	.8	2.6
tree planting	6	13	10.2	33.3
increases of green areas	7	8	6.3	20.5
beautification & aesthetic quality	8	2	1.6	5.1
street lighting	9	13	10.2	33.3
govt regulation of building inc	10	3	2.3	7.7
stopping constant str digging & burying	11	2	1.6	5.1
creating owner unions for blgs	12	2	1.6	5.1
allowing shop permits in ground flrs	13	1	.8	2.6
incr police on streets	14	1	.8	2.6
str calming measures in front of schools	15	1	.8	2.6
improving blg appearance	16	2	1.6	5.1
provision of ambulance service	17	2	1.6	5.1
preventing blg increases	18	1	.8	2.6
comm cooperate to improve their env	19	3	2.3	7.7
providing clothing shops	20	3	2.3	7.7
provision of a good bakery	21	3	2.3	7.7
provision of occasions hall	22	1	.8	2.6
provision of health service	24	4	3.1	10.3
closing down shops in resid area	25	1	.8	2.6
street widening	26	1	.8	2.6
taking away blg increases	27	2	1.6	5.1
painting blg facades	28	1	.8	2.6
provision cultural centres	29	1	.8	2.6
provision of a good sports centre	30	1	.8	2.6
creating community awareness	31	1	.8	2.6
killing stray dogs	32	1	.8	2.6
inc security in streets	34	3	2.3	7.7
garbage can provision	35	2	1.6	5.1
painting buildings	36	1	.8	2.6
provision of recreational activities	37	1	.8	2.6
permission of blg increases	38	2	1.6	5.1
preventing pollusive uses	39	2	1.6	5.1
providing parking areas	40	1	.8	2.6
inc dist bet buildings	41	1	.8	2.6
making a good traffic system	42	1	.8	2.6
inc of services	43	1	.8	2.6
provision of good youth centre	44	1	.8	2.6
provision of fresh vegetables	45	1	.8	2.6
Total responses		128	100.0	328.2

65 missing cases; 39 valid cases

Fig: 8. 96 Suggestions for improving the environment of respondents in Al-Asher

Fig:8.96 shows the responses of the samples in al-Asher to giving suggestions on how to improve their environment. The most common response was improving street asphalt and paving, and increasing cleanliness in the area. Other very common responses are tree planting, street lighting, and increasing green areas. Others are the provision of health services, increasing community co-operation, increasing security in streets, regulation of building extensions and increases, and providing a bakery and clothing shops. Many of the responses in al-Asher are similar to those in Kerdasa with the exception of providing security, and increasing community co-operation.

CHAPTER NINE
Outcome

Case Study Outcome

9.1 Introduction

The objective of this chapter is to present control indicators introduced in Chapters 4-6, and sustainability indicators deduced from Chapter 2. The list of these indicators and how they are observed in the case studies were presented in Chapter 7. From the data presented[1] in Chapter 8, the indicators will be identified in each case study. In this way we can assess the contribution of each case study to sustainability and identify control indicators. This will enable the research to draw relationships between individual sustainable and control indicators, as well as draw an overall understanding between the two concepts. Finally it will be possible to assess the contribution of local control as defined towards sustainability, which is the primary objective of the study.

9.2 Order System Indicators

The following are the control indicators derived from chapter 4, which were compiled in Chapter 7.

9.2.1 Control for Local Authorities

Al-Asher settlement is part of greater Cairo and located on its' periphery. As such it is part of a large and complicated system of building regulation. In Egypt there are different building regulations for urban areas and for suburban. Kerdasa is officially a suburban settlement while al-Asher is part of Cairo city, and as such it is classified an urban settlement. This is a critical difference between both settlements. In urban areas adherence to urban laws is stricter than that suburban areas like Kerdasa. Building laws in Egypt apply directly to the city and state recognised urban areas. In localities the execution of the laws is left to the local authority (Nabih M E 1999). Because control and regulation of local authorities is lax, this has allowed the Kerdasa urban form to be free of central control and therefore develop organically according to the needs of the people and in a way adapted to their environment. This would not have been possible to a similar extent in other city areas. Variable (8.10.1) reflects local perception towards state control, and their preference. It indicates that people in Kerdasa are accustomed to weak state control and prefer it that way; while in al-Asher some are for and some against state control. In both cases local communities have accepted the extent of local state authority.

[1] Observed through survey question, archival data, or observation.

9.2.2 Forms of Submission / Phases of Control / Size and Remoteness

The following is intended to determine the forms of submission in both samples in relation to the different phases of control previously introduced in Chapter 4 with regard to dwellings.

9.2.2/1st Al-Asher Sample

The following section will discuss control patterns as seen in the three phases introduced in chapter 4.

1- Formation Phase:

The formation of the built environment in al-Asher is a process completely controlled by the state. It defines the design of individual residential unit, overall urban form and how it is to grow and expand in phases. The building process is executed by state owned contracting companies. There is no role for the individual in defining the form of his property, or for the community in defining their overall urban form. The designer who is employed by the state defines the needs of the occupiers. At the same time the designer must reflect the objectives of the state. The main objective in this case is to provide low cost housing for newly-wed couples. During the formation phase when the built environment is designed and executed, there exists one major party identified in the state. The user and owner parties do not have any input in this phase and therefore can be taken to be non-existent. It can therefore identify the form of submission as unified. As such, there is only one party with unchallenged control. In its hands lies decision making and only its objectives are identified in the built form. This party is both remote and large in size; negatively affecting the artefact i.e. built form. Although a unified form of submission is a positive quality, because the party that holds all the claims is the state and not the user or owner party then this means, that it will not satisfy the needs of future users. The formation phase should also address the overall urban environment as well as elements of common use within the urban environment such as recreational areas or infrastructure. These are also in the unified form of submission where the state has absolute control.

The variable that supports this indicator is dwelling acquisition (8.12.1), which indicates that people only bought their apartments and therefore did not have any input on their form. Variable (8.10.4) indicates the local community's ability to regulate its local built environment. The sample responses show that the local community did not think it was possible for them to regulate the building process.

2- Management and Maintenance Phase:

This phase differs from the previous in that there must be identifiable owner and user parties to occupy built form. The owner party is those people that the state has allocated housing for. The owner and user parties are one initially because property is sold to families that are in need of housing. However with the passing of time some families relocated and either opted to resell their property or to rent it out. Variable (8.5.6) identifies to what extent renting can be found in the settlement, and therefore the amount of residential property that is either in the possessive or dispersed form of submission. The variable indicates that there is 20% renting of property among the sample compared to a 0% renting found among the Kerdasa sample. In al-Asher the prevalent form of submission is the possessive. The strength of each of the claims as determined by law is important. The state does not have a strong role to play in the management and maintenance of the built form. It may only intervene in this case if major changes are being made that it does not approve. While the user and owner parties have almost equal powers of control that can be defined through the rental contract. In general if it is a long-term contract, management and maintenance lie largely with the user party. If it is a short-term contract, then most responsibilities will lie on the owner party. Previously the state had decreed rental prices, however now this is left to market forces . Because the role of the state is a small one in this phase, the prevalent possessive form that can be found will tend to be unified. The user and owner parties are both small in size and closely involved with the property, while the state is large and remote.

In observing the multi-apartment block as a single unit, the owner party becomes a co-operative of individual owners. This party increases in size, but does not become remote from the property. The controlling and user parties do not change. Are owner party co-operative is often called an owner union. Its responsibilities are the elements of common use to all apartment owners; these are the staircase piping and overall structure of the block. These co-operatives are weak because there are weak relationships between the owners of the properties and local community as a whole. This is reflected in variables (8.13.1-3). In relation to the apartment block in its entirety, it is in the possessive form, where the owner party is weak and unorganised.

Central services and facilities within the urban form such as infrastructure are completely in the hands of the state. The state is responsible for overall management

and maintenance on the behalf of users and owners. In this case the controller party as well as the user and owner parties are large in size. At the same time the owner and users have no claim of control over the services, other than how they use them. Variables (8.10.10-11) indicate that the state has complete control over infrastructure services and that residents there prefer it that way. While variable (8.10.9) shows that local residents do very little maintenance. We can assume that the infrastructure is centrally owned, while local residents become only users. In this way the services are in the permissive form. Both parties are large in size, but neither can be remote because of the vital role of infrastructure provision in the urban environment. Recreational services such as sports centres and other central facilities have the same forms of submission as infrastructure.

3- Adaptation Phase:

This phase relates to making structural changes to the built form. Such may be relocation of wall partitions or making additions to the overall structure. Since these are apartment blocks and the users of the apartments do not own the land, such changes are legally compex. Changing the location of internal partitions are permitted and accepted by the state. Making extensions to the block itself was an illegal act that was later legalised. While the state does not play a role in activities like changing internal partitions where consent is not needed. In the case of making structural extensions, it does have a role to play in that it has made decisions on whether to legalise them or not. In this case an informal co-operative of owners is set up whereby it manages the building of these extensions. Apartment owners that are vertical to each other must approve this and form the co-operative[1]. In this process there exists only a controller party in the state and an owner party in the co-operative. The form of submission becomes possessive. Both parties have a high level of control where the state is a regulator. The owner party in this case is large but not as large as the state as a party. Neither of the parties is remote in this case.

This adaptation phase will also apply to the opening of shops in undesignated locations. These will be treated similarly by the state that decides either to permit or prevent them. In this case the owner party is small as represented seen in the property owner. Variable (8-10-2) indicates the samples preference towards the making of these extensions and

[1] Observe picture gallery.

state controls on them. While variable (8.10.3) identifies the samples need to make extensions, ability, and the method; a large number agreed that this was possible (50%), while a majority did not think they could do so.

9.2.2/2nd Kerdasa Sample

1- Formation Phase:

The formation of the built environment as a whole in the Kerdasa settlement is organic which indicates that it is defined and controlled by the local community and collective owners. Variables (8.10.4-7) relate to local control in the regulation of built form. There is clearly a local system of norms and conventions that control built form in the settlement (8.10.6), and it is the local preference there that control should be more in the hands of the community. At the same time interviewees were confident they had the ability to manage their built environment themselves (8.10.4), the most common reason being that development is their own interest and because of good relations between people. There was also a perception that the state did not effectively regulate. At the same time the sample perceived that the state still had too much and excessive powers (8.10.1). This is because more controls were being applied to building on agricultural land on which the local population depended on so much for providing their own shelter. We can therefore identify two parties with claims of control, the owner and controlling party. The prevalent form of submission therefore becomes possessive. Since state control is weak, the form of submission will tend to be unified. This obviously enhances the ability of the party with the most powers of control, the owner party, to identify its needs in built form. The size of the owner party is very small and involved with its property when relating to a single unit of built form. This adds to the ability of the party to define its surroundings. In all this, pattern of control is the most positive in terms of quality. When relating to defining the form of the urban pattern as a whole it will also be in a possessive form tending towards unified form of submission, as demonstrated by its organic pattern.

The local community provides much of the local infrastructure. The individual property owners make many wells and seepage tanks. In some parts of the settlement the community initiated a wastewater network co-operatively. However electricity is provided by the state entirely. At the same time, treated water outlets are provided by the state in some places. During the time of conducting the survey, a wastewater network was also being installed throughout the settlement. Those infrastructure

facilities being provided by the local community are in a unified form of submission, while those provided by the state are in a permissive form. There are other various services being provided locally, such as nurseries. These are community run as a business and are in a unified form of submission. Most mosques in the settlement are executed and managed locally.

2- Maintenance and Management

The management and maintenance of residential property is in the unified form of submission where the owner has complete responsibility and authority. The owner party is small and naturally very involved with its own property. Residential properties are not subject to the same circumstances of that in al-Asher. They do not have elements of common use, where more than one owner shares use like staircases. This means that within the realm of private property there is absolute authority for the owner.

Management of the overall urban environment including streets is a more complex issue. In Kerdasa, this management is a co-operative responsibility. Each individual is responsible for the area of street that is adjacent to his property. There is a system of norms that manage them (8.10.8). Such norms will typically include cleaning and prohibiting the blockage or outdoor circulation routes with inappropriate storage, maintaining the right of passage. The state does not have a role to play in the street environment. Cleaning and even garbage collection is locally managed. The street environment is therefore in a unified form since it is not only the combined responsibility but also owned co-operatively by local residents. This is a form of community collective responsibility. The management of the Monday market area follows the same control pattern where traders have the collective responsibility of maintaining the space allocated for stalls.

The maintenance and management of the infrastructure is also community controlled, since much of it is also locally owned (wells & seepage tanks). Variable (8.10.9) indicates the much of the maintenance on infrastructure is made locally even relating to the central electricity supply system. Variable (8.10.10) and (8.10.11) indicate that most maintenance is executed by the local community and that they actually prefer to have more authority than the state in relation to infrastructure. In this phase of control, infrastructure is in a possessive form of submission with some responsibility for the state and some for the local residents.

3- Adaptation Phase:

The adaptation phase in Kerdasa is very strong because of its organic growth. Dwellings and residential property grow with increases in the need of floor area. In the case of making alterations, the state has a smaller role to play than it did in the formation of a built form. The form of submission is unified this time with only one party controlling which is the owner party. This is better for the built form itself and for achieving he goals of the user. Variable (8.10.2) shows satisfaction with state control, which in the case of making extensions is weak (8.10.3). It is important to remember that making extensions to dwellings still has to be confined to the norms of the local building process that are found in Kerdasa.

9.2.3 Existence of Norms Governing Local Community

There is a strong system of norms in the Kerdasa settlement that not only governs the building activity but many aspects of daily life not found in al-Asher. This system of norms is essential for the organic growth of the built environment to occur. Not only is there a system of norms that govern building activity but also a system of conflict settlement (8.10.14) that arbitrates conflicts between individuals. There is local confidence in this system that is managed by the elders of the community. It is accepted by the local community and is also recognised by the state. Variables (8.10.6-7) indicate the community perception of the norms governing building activity, and their preference towards these norms is positive. Variable (8.10.8) indicates there is also a system of norms relating to the management of public areas. These norms include a ban on openings such as windows on part of building that sits on boundary of a property, or by prohibiting adjacent doorways, and a 1.5m setback before an opening could be made. This system is made possible through the strength of the community and its ability to co-operate to achieve their common goals. The comfort of the Kerdasa sample with local control over the building process is indicated in variable (8-10-1). Most the respondents the samples do not wish for more control from the state. In all there is a very strong system of norms in Kerdasa that is not found in al-Asher, and this system pertains to general life, building activity, and management of common elements in the built form. In contrast, this system is non-existent in al-Asher.

9.2.4 Community Ability to Manage Infrastructure

Ability to manage infrastructure is usually the authority of the state. In al-Asher this is perfectly true. Because of the organic nature of Kerdasa, the community has always

been able to provide its own needs without the help of the state. This gave Kerdasa a knowledge and experience in providing simple infrastructure services. Variable (8.10.9) indicates the level that the community is maintaining the infrastructure services and variable (8.10.10) indicates that they do so more than the state does and that this is satisfactory to them. Variable (8.12.4) shows the they felt they had that ability to maintain and manage their infrastructure service and facilities, although they thought there was also a role in this for the state. In comparison al-Asher sample did not see they had this ability, and thought that the role of the state should be the dominant one. The ability to manage is only possible with collective responsibility as identified in variable (8-13-3) confirming their ability to work together.

9.3 Control over Economic Activity Indicators

The following indicators also act as sustainability economic indicators, and will be discussed in relation to sustainability, at length later in the following parts of this chapter.

9.3.1 Diversity of Economic Activity / Use of Local Resources and Methods

There is a strong diversity of economic activity as seen in the employment of the people comprising the samples. This indicator is very similar to other sustainability indicators that are to come later. In Kerdasa the economic activity relies on local knowledge and resources in terms of local farming and the trade in produce in addition to some tourism. In al-Asher there is no local employment or economic activity ownership to be taken into account. Variable (8.5.1) indicates the diversity of local activity.

9.3.2 Size of Local / Self Employment

Local employment is higher in Kerdasa than it is in al-Asher. Self-employment and local employment are the same because people in Kerdasa who initiate their own business, will do so locally. A majority from the Kerdasa sample claimed to have their own businesses, although this was often combined with other work. In al-Asher the vast majority of people were not self-employed. Variable (8-5-3) shows the level of self-employment and therefore reflects whether it is local or not. Variable (8.5.1) indicates the identity of employment and therefore if it uses local resources. In conclusion self-employment and local employment is very uncommon to al-Asher in comparison with Kerdasa.

9.3.3 Control over Built Form of Economic Activity Indicators

The following economic activity indicators of control relating to built form.

9.3.3/1st Kerdasa

Although the built form of economic activity is treated similarly to any other built form in the urban pattern in many respects, much of it is rented by the owners to other individuals. Where property is rented, built form is in the permissive form of submission. There is only an owner and user because of the weak role of the state in the regulation of economic activity. In the case that the space is not rented this puts it in the unified form of submission. The activity is usually a shop or workshop. Because most economic activity in the settlement is small, the size of the parties becomes small but not remote. In Kerdasa there does seem to be norms that govern these activities. The most important norm of these is that if the activity causes harm to any one occupying nearby property or to passers by, it should not continue. The definition of what constitutes harm is defined locally. This harm may be in the form of noise, odour, or physical impediments. In some cases relocation of the activity was necessary to satisfy neighbour demonstrating the strength of these norms and the ability of the community to execute them and reach agreement. Other forms of harm might be when a trader of a commercial activity stores goods in the streets and obstructs peoples right of passage. Any disputes in such matters are brought to the elders of the area who decide the course of action when individuals can not agree together. Thus the norms are an integral part of the local control system over the economic activity. Variable (8.11.2) indicates the existence of norms governing economic activity in Kerdasa which are not found in al-Asher.

9.3.3/2nd al-Asher

In al-Asher, economic activity is in the form of services. Individuals who often do not live in the settlement own them. Commercial property was originally sold to individuals by the state who operate them in the way they see fit. They are treated like apartments in the relationship owners have with the state. In the formation phase, built form is unified because at the time of formation the owner party has no identifiable role. In the management and adaptation phases, the built form is in a co-operative form. In this case, because the state does regulate the economic activity, it can be seen to have a reasonable amount of control. It is possible for the owner of the property to rent it out in which case the built form would be in a dispersed form of submission. The amount of renting out commercial property was not measured in this case. There are no visible norms

governing economic activity in al-Asher. Because the shops provided in the design of the property are small, this means that the owner party is also small. No large companies will take over these properties. While the state is a large party, it is not remote. This is because the state collects taxes from shop owners and this provides an incentive for the state to regulate.

9.4 Knowledge and Technology Indicators

The following are control indicators relating to the function of knowledge and technology.

9.4.1 Forms of Transformation of Knowledge

There are three different parties that control the transfer of knowledge as identified in chapter 6. The first of these parties is the designer party, which relates to the architect. In al-Asher the designer party is not an individual, rather a firm of consultants or group of firms.

Al-Asher was planned and designed by the state by commissioning these consultants. The party responsible for design is a large party, and is remote for the simple reason that the built form was not executed until a long time after the design and because they did not have any role to play in the execution of the built environment. The knowledge used by the designer party is based on that of architectural design education in Egypt, in turn based on Western design principles. The builder party in this case is an organisation, in the form of a contracting company. The technical methods used are acquired through a central education system, much of which is managerial. The party is large, but can not be seen to be remote because it is responsible for the execution of the project. The user party is non-existent in the design and build processes and therefore does not have any input whatsoever on the built form. While it is a small party, it is remote from the point of view of transformation of knowledge. The form of transformation of knowledge is seen as dispersed in which the user has no powers. The user, designer and builder parties are dislocated from the local environment where the built form is being made, and are not sufficiently aware of local characteristics to fully adapt their methods to the local environment. Although designers may conduct site visits, they have not lived there and are designing machines for living.

In Kerdasa the situation is very different. The designer, builder, and user parties might be one, particularly in the case of building using mud. Building techniques using mud

are accessible to all and therefore it is possible for the owner of a property to build his own dwelling. More commonly however, an owner of a property hires labour or a contractor. In this case the user or owner determines the design of the dwelling unit with the help of the builder who may have some experience. This enables the user to have maximum input on the built form. The labour used is always local which benefits the local economy. All parties involved in the local building process are from the local environment; the knowledge and methods used are therefore adapted to the local environment. The dominant form of transformation of knowledge is where the user specifies the design and the builder works to execute it. Here the user has ultimate control, but not in the technicalities of the building process itself, these are left for the builder. Also, all parties are small in size and heavily involved in the process. In the case of building mud houses, the form of transformation of knowledge will be unified because the methods and techniques are common knowledge, and therefore there is no absolute need for the input of a builder or a designer.

9.4.2 Use of Local Knowledge and Materials

In al-Asher there is no use of local knowledge, but rather the knowledge of the central education system. In Kerdasa the knowledge used is far more local. This does not mean that the local community is not able to adapt to new and better ways not already developed locally. This is a very important factor because a local builder in Kerdasa is able to acquire the knowledge of building with reinforced concrete and to adapt it to the local needs. The preference of reinforced concrete methods is because of its durability and its ability to allow for an increase in the number of floors and therefore floor area. In this way more use could be made from a plot of land. Concrete can be used in either making wall bearing structures or skeleton structures. These structures can be combined with the use of a mud structure as an extension. In summation the same local builders, previously responsible for building in mud, were able to learn the new methods, and even gained the ability to design the components of the reinforced concrete (from steel to the amount of cement and sand) without any formal education. In this way the knowledge becomes local and can be transformed through generations of builders. The users are responsible more for the design and layout, and overall management of the comstruction in Kerdasa. The involvement of the user party also entails that they have a lot of understanding of the building process in order to properly execute and supervise. Knowledge in al-Asher differs in that It depends on academic learning and research and develops along an international perspective. This has many advantages, but at the

expense of its local dimension. More important is that it forfeits local control over the process and hence does not build on previous local knowledge.

Building materials used also determine the ability to control the methods. When using mud, the materials are readily available to all. In the case of reinforced concrete its components cannot be found locally. However the use of bricks can be taken from the local environment. This can be found in the recycling of bricks found in Kerdasa and in the kinds used that are from local materials. Use of local materials will also contribute to the local economy.

9.4.3 Forms of Local Technology

The form of technology involved is an important determinant of the ability of the local community to control it. Technology in the built environment can be seen as either in the building technology itself[1], or infrastructure technologies. The building technology should be simple enough for it to be used locally. In both settlements building technology use reinforced concrete skeleton systems. In some areas of al-Asher, there is a prefab system, but it is not common. Prefab technology is not accessible to individuals to use as a building method and therefore cannot be used locally. In most cases in al-Asher the skeleton system is used. This is to a degree an accessible method as can be seen in Kerdasa. The ability to build large structures makes it useful for large development projects. In Kerdasa this building technology is used but because of a smaller number of floors, two or three maximum, it becomes simpler to undertake its execution. In the case of mud building the methods used are even more accessible. The simpler the technology, the more controllable it is locally, as seen in Kerdasa in comparison with al-Asher.

The technology used in the infrastructure is also very important. The common practice is for it to be centrally provided because of its complexity and for the inability of individuals to control and manage it. In al-Asher conventional infrastructure technology is used. In Kerdasa the methods used do allow it to be locally controlled. This is seen in the seepage tanks found in each property, also the digging of wells for water. However, these methods may not be sustainable or healthy. The use of seepage tanks allows the wastewater to reach the water table and therefore pollute ground water only to resurface in well water. So, although the technologies used are accessible and controllable to the

[1] Structural methods such as steel frames or prefabricated building parts.

community, they are not always appropriate to maintain or ensure adequate living standards.

Variables (8.12.2) and (8.12.3) assess both samples need for architects and civil engineers. Results show that in Kerdasa the community is more comfortable to do without professionals indicating they had sufficient knowledge locally. Variable (8.12.1) shows the samples preference in acquisition of their home. The Kerdasa sample preferred the local system where people manage the building process of their dwellings; while in al-Asher some preferred buying and some inclined towards hiring a contractor. In terms of ability to maintain infrastructure (8.12.4), indicates that the sample in Kerdasa perceived a higher ability to maintain their infrastructure.

9.5 Sustainability Indicators

The following are the sustainability indicators formed in Chapter 2 and compiled in chapter 7. They are supported by the information derived in the questionnaire in chapter 8, and on site observations.

9.6 Economic Indicators of Sustainability

The first group is those related to economic indicators of sustainability as seen in the following.

9.6.1 Economic Performance

Economics is not this researchers area of expertise or the area of study. However, observation of economic performance as an indicator is supportive to the research. The econoic environment in both settlements is very different. In al-Asher the economic performance depends on that of Cairo and Egypt as a whole since there is not distinct local economy. People living in the settlement largely depend of employment in the inner city areas or as close to it, reflected in the home/ work relationship (8.8.3). This is not the same case in Kerdasa. Although the local economy there largely depends on the economic climate in Egypt, there are many local economic cycles and a more distinct economy. In both cases the populations are not affluent, and therefore are not part of a strong economy (serving to harmonise both samples), indicating a not a strong economic performance. In both settlements it cannot be said that there is a strong economy. Although in the case of Kerdasa it can be said that there is more of a local economy than can be found in al-Asher, it can also be said that one has a more distinct local economy.

9.6.2 Sustainable Economic Activity or Industry

9.6.2/1st Appropriate Technologies

In this indicator the economic activity of al-Asher will not be discussed because of its diversity and because it is not a local economy as such, also because whole settlement acts like a satellite town to Cairo. From the questionnaire and data provided in Chapter 8, the economy in Kerdasa is dependent on small crafts, trade, and agriculture. Crafts include making garments, tourist souvenirs, steel ornaments, and carpentry. Since they are small in size and dio not require large factories means the technologies used are more environmentally friendly. However, some of these activities produce some pollution, particularly the shaping of steel (at least sound pollution). Such activities are concentrated in the same area and are located them on the outskirts of the settlement in order to minimise causing harm to anyone. In general local economic activities do not use harmful technologies to the environment. This is for two reasons. The first is that the local community is united and cohesive, and community individuals will look out for each other and avoid causing harm to their neighbours since they are in constant contact with them and often are related to each other. The second reason is that the technologies used are very small scale suited to the abilities of the community. Such technologies are far less pollusive in nature. The fact that the community allows mixed use makes it vital to take care in particular activities because it affects them so much and therefore they must be more careful. In this way they contribute to sustainability because in doing so they live in a better environment.

9.6.2/2nd Environmentally Friendly Materials

This refers to the products and by products of the economic activity, and their affect on the environment. Because the activities found in Kerdasa deal only with basic materials and non-synthetic ones, this makes the products and the by-products non-pullosive. In the case of al-Asher we cannot make any comments about the situation because there is not local economy in the first place. However, because most employment there is clerical, we can state that employment is more environmentally friendly in nature.

9.6.2/3rd Products that Meet Basic Needs and Some Individual Wants

In al-Asher, there is no local production activity, and therefore this indicator will not apply. In Kerdasa, the products produced in the settlement broadly satisfy the guide of meeting only basic social needs. They include clothes, and food trade, agriculture and crafts, along with products made for tourism which are still very simple ones.

9.6.2/4th Low and No-Waste Production Processes

Waste production in the case of Kerdasa has to be small because the economic activity is small. Also because the individuals are poor and therefore always attempt to reuse material and not throw it away. In general this indicator cannot be observed to a greater extent in the case studies.

9.6.2/5th Safe and Skill Enhancing Working Conditions

The nature of small crafts business is that it is skill enhancing. The working conditions have to be as good because most own their businesses. Also the relationship between the community is good and people are either related or have good relationships with each other, this means of you work for someone there should be less exploitation by the employer. However it still must be stated that because these are small businesses, the working conditions may be less than if employment was for a large organisation. Although employment of residents is not local, it should have better working conditions because many will work for large organisations.

9.6.2/6th Energy Efficiency

Businesses in the Kerdasa area because of its nature being small and craft based are more energy efficient than other employment activities. Energy efficiency cannot however be measured in a reliable way. This indicator does not apply to al-Asher.

9.6.3 Strong, Diverse and Sustainable Economy / Economic Activity

The following are indicators of economy are directed at the community or those living by them, counter to measuring the success of the economy only through purely economic factors.

9.6.3/1st Community Self-Reliance and Control

This indicator is meant to find out to what extent the economic activity is local. This is very related to control indicators of the economic activity function presented earlier[1]. This indicator relates to the extent to which a community is self-reliant economically. It can mean a number of things among them the degree the economic activity is owned locally. It can also mean the extent the activity uses local resources as found in Kerdasa. This is only one facet of the economic indicators of sustainability but a major part of

[1] An overlap between indicators of control and sustainability is because local control and self-reliance of the economy is party of sustainability initiatives.

control indicators. The previous indicators of the control over economic activity and its variables also support this one. Survey variables supporting this indicator are; employment (8.5.1), self-employment (8.5.3), and home/work relationship (8.8.3). In all there is a higher level of self-reliance and control in terms of local economy in Kerdasa than in al-Asher.

9.6.3/2nd Community Organisations

There are no community organisations in either settlement that promote the local economy. Such organisations do not exist in Egypt except at a very central state level and maybe sometimes through non-profit organisations. However, if we observe the local economic cycles and the cohesion of the community that helps them to be able to work better together, it is evident that there is a level of co-operation in the local economic activities. This can be found in local production cycles, or producing garments, which go through a number of phases, each small business contributing to the final product. Again, this would not be possible if the community was not so cohesive. While it cannot be stated that there are community organisations as such, the extent of co-operation there achieves similar goals of economic development organisations that are prescribed.

9.6.3/3rd Sustainable Employment

Commenting on the sustainability of local employment cannot be done in a reliable way, but it is possible to give some indication to it. Sustainable employment is contributed to by a number of factors. One would of course be the strength of the local economy, another the diversity of the local economic activity, both of which have been observed earlier. Diversity of the local economic activity is higher in Kerdasa. This is because many of the residents there combine a form stable income found in civil service, and another form of income as in a private business like trade and craft manufacturing. These activities are many and varied and therefore add to the diversity to the economic activity, and are a factor for stability and sustenance of employment. This indicator supported by employment variable found in each settlement (8.5.1), and self-employment (8.5.3).

9.6.3/4th Local Economic Development Plans and Management

This indicator is very similar to that of establishing community development organisations, but in this case local authorities take action. Local authorities in both settlements have not developed any such plans. Economic development plans in Egypt

are very central and will not be formed except in the case of a large city or the country as a whole (Nabih 1984).

9.7 Environmental Indicators of Sustainability

The following are the environmental indicators of sustainability suggested in chapter 2 and compiled in chapter 7. They observe pollution through different media it occupies.

9.8 Pollution Through Air

9.8.1/1st Heat Pollution

Activities that contribute to heat pollution are heavy industry and the use of the automobile. There is not heavy industry in either of the two settlements, but such industries do exist in the greater Cairo area. The use of the automobile is the second contributor to heat pollution, and is much more common in al-Asher settlement and Cairo as a whole than in Kerdasa. The use of the automobile is for two major reasons. The first is to go to work, and the second is for daily needs. Any variables related to transport and mixed-use serve this indicator. Those variables found in the survey and support this indicator are; transport for needs (8.8.1) and, transport to work (8.8.2), and home/work relationship (8.8.3). All indicate more use of the automobile in al-Asher.

9.8.1/2nd Particulate (Dust and Solid Particles)

Economic activities do not contribute to particulate pollution in Kerdasa. However particulate pollution does exist in both samples. In the al-Asher, there are many vacant plots of land where there is a lot of dust and sand. Wind then makes this dust airborne and increases air pollution. At the same time many streets are not yet paved and green areas not planted, also contributing to pollution in the settlement. In Kerdasa the main cause of particulate pollution is because all roads and pathways are not paved. Common complaint of this form of pollution in Kerdasa is indicated in open-ended questions (8.14.1-7). While in Kerdasa air quality is clean, as indicated in the open-ended responses. Variable (8.7.5) shows the samples perception of air pollution where satisfaction is higher in al-Asher.

9.8.1/3rd Oxides

Oxides can also be formed as a result of both industrial activity and the use of the automobile. Again, large industrial activity is not found in either of the settlements but in greater Cairo as a whole. This only leaves the use of the automobile, which can be measured through the same variables mentioned during observing heat pollution. Those are; transport for needs (8.8.1) and, transport to work (8.8.2), and home/work

relationship (8.8.3). Of course the production of oxides particularly carbon monoxide, are a more serious environmental risk than heat pollution is.

9.8.2 Water / Liquid

The following are forms of pollution in water or in liquid form.

9.8.2/1st Waste Water (Sewage)

This indicator relates to the appropriate wastewater treatment. This can be caused by the treatment method itself, or if there is leakage. In al-Asher there is a general satisfaction towards the overall system. There are complaints however because of excessive clogging of pipes in the apartment block itself sometimes causing over-spills. There are also complaints because of the width of the pipes and that the execution of the network is not up to standard. In Kerdasa, most of the settlement is still without a wastewater system, where all rely on seepage tanks. Recently a wastewater system was being installed in the settlement. Inappropriate wastewater treatment is a serious problem in Kerdasa because it ends up in the ground water table used for drinking and in local streams. Sometimes discharge is not absorbed by the ground, and overflows into the streets. Variable (8.7.8) reflects the quality of the wastewater network in both samples. Open-ended questions also act as a support. In both samples the sewage system is mentioned as a negative aspect, although more so in Kerdasa. Also complaint of the pollution of streams are mentioned. Dissatisfaction with the quality of water as found in Kerdasa is attributed to inappropriate wastewater treatment there.

9.8.2/2nd Heat and Industrial Waste

Heat will not be discussed here because it comes from heavy industry and electricity plants, none of which can be found in either settlements.

9.8.3 Solid Waste

9.8.3/1st Household Waste

This indicator relates to garbage collection and treatment. In both cases there is no real notable waste treatment. In Kerdasa however, there is also no state garbage collection in most places. Some of the household waste is disposed of using incineration. Each household would have a burner where by they would burn the garbage and at the same time heat their homes in the winter. Garbage was often mixed with manure and vines from the fields before burning. This was reported to produce bad odours and pollute the air. In al-Asher, there is state garbage collection. The system there is not adequate in

terms of the number of times and locations of disposal seen in recurrent garbage dumping in the streets and vacant plots. Waste disposal by the local community in public areas constitutes an abuse on their own environment. In Kerdasa, although there is no state system, a community managed garbage collection system disposes of it appropriately and disposal is not found in public areas. In all cleanliness and management of the environment is higher. Variable (8.7.4) relates to the management and cleanliness of public areas, indicating higher satisfaction in Kerdasa. Also responses to open-ended questions, cleanliness and household garbage collection are mentioned in both samples, more so in al-Asher.

9.8.3/2nd Building Waste

Building waste is the material that is discarded during the building process. In al-Asher, building waste is often dumped in public areas. This is because of the weak enforcement of laws by the state on small contractors who find it an easy way to reduce costs. This is a frequent trend there particularly because there are many locations that are far from sight and not adequately lit up at night. In Kerdasa, building materials are not discarded. They are collected recycled and resold providing a source of cheap building materials by the community there. Items like doors, windows, old sanitary appliances and even bricks. This is a good example of recycling, and although people there would not know what recycling is by definition, they do it because of the cost of the materials and because of the cost of dumping these materials in an official dump site. This makes recycling very feasible because residents are involved in the building process and its management and therefore reducing costs shows a direct benefit to them. There are many small warehouses trading in old building materials to the extent that people come from outside the settlement to buy these. This indicator like that of houshold waste is supported by variable (8.7.4) like the previous. Also, open-ended responses relate to the dumping of building materials in public areas.

9.8.3/3rd Industrial Solid Waste

No solid industrial waste can be found in either samples, and therefore cannot be discussed.

9.9 Social Indicators

The following are the macro social indictors of sustainability. These indicators and their reflection in built form will be discussed in the following.

9.9.1 Equality for Women and Disabled

In both settlements there does not seem to be any particular care for women and disabled. For women there is nothing to show that built form was designed to accommodate their needs. In al-Asher the design of the settlement indicates all the deficiencies indicated earlier in chapter 2 in not providing employment and adequate services close by in the settlement. In Kerdasa no special treatment for the needs of women can be seen. Although, the role of the women in the community greatly differs from that indicated in chapter 2, locally they have the responsibility for the internal management of the home. The form of the dwelling in Kerdasa reflects the needs of women as housewives. The dwelling (**Fig: 6.3**) there has an inner area in which women undergo their daily household activities of cooking and washing etc. In both cases differences between the needs of men and women were not taken into account. The same would apply for accommodating the needs of the disabled, no special treatment is afforded to them. This would indicate that there is a level of inequality towards these two groups. Whether in Kerdasa or al-Asher, the low affluence is probably the major reason for not being able to do so.

9.9.2 Equity Between People

In the case of al-Asher, the original design of the urban form was intended to only house low-income newly wed couples. This meant that there was only one social group living in there, causing segregation in with neighbouring settlements. With the resale of the apartments, there was more diversity in the social background of people living in the settlement. Segregation may occur not only between the poor and more affluent, but also between different groups like blue-collar and white-collar workers, as commonly found in Egypt. The apartments in al-Asher were only sold to civil servants. This contributed to this segregation.

In Kerdasa the situation is different. There is not segregation between poor and affluent. All live together side by side, only differentiated in the quality and size of the dwelling of each. Rather residents live close to their extended family members. The diversity of employment, where often many may combine both blue-collar and white-collar workers, indicates that there is also no segregation in relation to the form of employment.

Segregation contributes to inequity when some areas are afforded better services than others are by the state. Within al-Asher settlement itself there is no inequity, but when

comparing it with neighbouring settlements, services are apparently of lesser quality than those more affluent settlements. This can be seen in the maintenance of the infrastructure, also street lighting and greening of public areas. In Kerdasa the state does very little, and there is also inequity from the state towards it compared to neighbouring areas. Both settlements are therefore similar in how the state approaches them.

Survey variables relating to segregation and equity are varied. Identity of employment (8.5.3), and education (8.5.4) indicate the background of the respondents in each sample and social group. The quality of social relations indicates whether the individuals in each case are comfortable living with people of different background (8.13.1, 8.13.4, & 8.7.3). There is stronger acceptance of people with different background in the Kerdasa sample than there is in al-Asher.

9.9.3 Education and Environmental Awareness

Environmental awareness and education is a role for the state. There is no policy of this in Egypt on a whole. Awareness among the residents in both settlements is identifiable in that they must keep the quality of their direct environment good for their own benefit. Residents' awareness of the cleanliness of their environment constitutes a form of environmental awareness. Because Kerdasa is a farming community and because social relations are stronger, they community seems to be more aware as whole. This can be seen in their concern for the pollution of their water supply, whether in wells or local streams. Al-Asher residents have a similar awareness observed in their responses to open ended questions where dumping of building materials and garbage is a strong concern. This environmental awareness is not towards of the global environment but of their immediate environment.

9.9.4 Human Rights

Human rights in the sense intended in sustainability can only be viewed at a central state level and not be identified at a local level in this research.

9.9.5 Eradication of Poverty / Provision of Shelter

Eradication of poverty and provision of shelter are often an assessment of state ability to provide. Eradication of poverty is enhanced by strong local economics. In terms of built form, the provision of shelter contributes to this indicator. The strong community in Kerdasa supports this objective. The ability of families to live together means that they will help each other in times of need. Local economic cycles and ownership of small business are also supportive.

Adequate provision of shelter is a sustainability objective directed at the state. In al-Asher, the whole settlement is made by the state in order to provide housing as part of a state policy. Local residents do not have any input on the process. In Kerdasa, the process is fully controlled by the local community and local property market as found in control indicators. Although both samples are not affluent, the individual in Kerdasa is able to have shelter according to his financial capabilities, and at a slow and gradual rate according to what he can afford. In this way provision of shelter becomes a more flexible and simpler task. It also means that the provision of shelter becomes more affordable and respective of the needs of the dweller. However, we must remember that provision of shelter is not subsidised like it is in al-Asher. In all the system seems to be better. This may imply that the state maybe provide resources in terms of land and building materials rather than the finished product, and allow for system of property management of building. Satisfaction with the dwelling will indicate the preferences of the samples to either of the two methods systems (8.6.1-15). This can be identified in the positive and negative aspects of the open-ended questions, in which lack of area in al-Asher is often mentioned.

9.9.6 Health

Again, health and health care are often indicators that have much to do with state provision particularly for the poor. Assessment of the local system in each case towards provision of health is an important indicator. In both samples open-ended questions show complaint of a lack of provision local healthcare. It is interesting to see if the local systems have the ability to compensate a lack on the part of the state. In the case of al-Asher, some small private clinics started up, but they are by far not enough. In the case of Kerdasa there are much more private clinics and actually small hospitals which are financed by the local community particularly wealthy heads of families. They then have doctors employed in them. These are attempts to compensate for lacking services rather than to make money on the part of the owners. It must be noted that provision of shelter works towards the achievement of health, reflecting the inter-relatedness of the indicators.

Other factors that have bearing on the health of the local populations are found in open-ended questions. Such as uncovered streams that pose a health risk to local inhabitants in Kerdasa, together with inadequate waste water treatment, indicating an inter

relatedness between environmental and social indicators. In al-Asher health risks are caused by the dumping of household waste and inadequacy of disposal. Variables that have bearing on this indicator are open-ended questions, central sewage system (8.7.8), central water system (8.7.9), and neighbourhood management and cleanliness (8.7.4).

9.9.7 Promoting the Role of the Family

The family is a very strong basic unit of the Egyptian society that has always been the focal point of the society. The extent to which built form enhances the role of the family is what is being observed here. The built form in al-Asher, built form is dedicated to young new families. However because the floor area is small, it does not encourage the growth of the family and weakens it as a whole. The size also encouraged families to relocate and rent out their property often to students. This meant a decrease in the number of families as a whole within the urban form.

In Kerdasa the family is a very strong social unit, far more than in other places of Cairo. Family here does not mean just the smaller family unit of the father, mother, and children. But it includes the greater family of uncles and aunts. Related members of the community and from the same family will live in the same area. Each family has family elders that are responsible for solving disputes between individuals, and to which people go to when they have problems. The role of the family here is evidently very strong and reaching farther than what sustainability aimed for. It is the smaller family unit that is intended by the indicator. The nuclear family[1] is very common in Kerdasa. This is made possible only because the dwelling grows with the growth of the family, further reinforcing the strength of the family unit. Not only the dwelling and method of building are a translation of the needs of the family, but the whole urban form that accommodate members of the larger family circle.

Variables that have bearing on the strength of the family unit are; size of household and number of families (8.5.5), home and land ownership (8.5.7), living choice (8.5.8), existence of extended families (8.13.5). Also open-ended questions indicated that living with family was often of the positive aspects of the place.

9.9.8 Promoting the Role of the Community

Strength and unity of community is related to that of the family. This is because family relations contribute a lot to community relations particularly as seen in Kerdasa. There

is much less feeling of community among al-Asher residents than there is in Kerdasa. Relations between community and cohesiveness are much weaker. This can be explained by the fact that people in al-Asher come from very different backgrounds and have all come to live together through the acquisition of low cost housing. In Kerdasa, people have always lived together and so have their families. Strong family ties that exist and the overall sense of community all go towards achieving a unity between individuals. The relationship between individuals and their ability to co-operate together promote a role for community. This co-operative ability of the community is demonstrated by its' ability to form norms and conventions that regulate built form. It can also be seen in the ability to arbitrate disputes between individuals.

Built form as vessel for local residents, must encourage a sense of community and a role for it. This is identified in the spaces where the community will congregate. The number of these spaces and their quality indicate to what level the built form is conducive of community interaction and hence more co-operation. In al-Asher, community relations, interaction, and co-operation are very weak. The planned urban form did take into account providing spaces for interaction in the form of youth centres, and green areas. Although youth centres are operational, they are not well maintained and green areas are still not planted. In Kerdasa there are no planned spaces for community interaction. Instead areas for social interaction are community created and maintained like occasions halls, mosques, and coffee shops. Other spaces used for social interaction are the street, and homes. There are many variables that cover this indicator. These are social indicators (8.13.1-5), social interaction (8.7.3), identity of places of interaction (8.8.8), and open ended question responses.

9.9.9 Political, Civic Rights and Participation

Political and civic rights are the same for both case studies as they are for all of Egypt. These will not be used as indicator because they would need a long and extensive discussion. At the same time since there would be the same in both case studies then there is not reason for comparing them.

Participation in determining policy and the form of the environment can be discussed, and are significant because they relate to control. In the case of al-Asher there is no participation either in terms of the formation of the built environment or its

[1] More than one generation live within the same built form

management. This is not the same in Kerdasa, where the formation and management of much of the built environment is locally defined. The system that exists their is more as a result of control rather than participation. The reason for this that there is a lack of state control in the area, allowing the residents to manage their own environment. Sustainability encourages control but in a weaker form seen in participation. In order to achieve community participation or any level of control, there must be spaces in the built form where the community congregates. These can be the same spaces mentioned in the previous indicator. Variables that have bearing on this indicator are identity of places of interaction (8.8.8) and community problem management (8.13.3).

9.9.10 Promoting Social and Cultural Activities

Exercising social and cultural activities and help to unify the local community. Many social and cultural activities are exercised within the family unit such as weddings, and religious occasions. The home is often used to hold such activities. The home in Kerdasa because of its relative size in comparison to apartments in al-Asher is more supportive to holding these activities. Many activities also can take place on a community level. These may also be religious activities and more distinct local cultural activities. There are some distinct cultural activities that take place in Kerdasa related to particular figures and occasions in the history of the settlement. The ability to exercise these activities is supported by the strength of community relations and ties.

The same spaces mentioned for community interaction mentioned in (8.8.8) are those that are used for cultural activities, particularly the occasions halls found in Kerdasa. An example of the dwelling in Kerdasa conforming to cultural values are the decorations painted on them when a member of the family goes for pilgrimage. In religious occasions, decorations are put up in the streets, and occasion halls and mosques are used to hold such festivities. In conclusion people in al-Asher will practice cultural activities within the family unit, with little activity exercised on a community level. In Kerdasa practice happens both on a community level and individual family level.

9.9.11 Quality of Life

This indicator can be ambiguous, and can also be used as an umbrella for all other indicators. It is not measured in the case studies directly, i.e. to measure how people felt about the quality of their life, was not intended. Instead, what was intended was to measure the contribution of built form to the quality of life. The measurement of the contribution of different components of urban form towards quality of life took a large

part of the questionnaire. This was done through the measurement of satisfaction of dwelling (8.6), neighbourhood (8.7), and settlement (8.8). Those variables together with the open-ended responses identify the positive and negative aspects of the settlement and assess how urban form can enhance quality of life.

9.9.12 Summation of Macro Economic, Environmental and Social Indicators

Macro economic indicators of sustainability in both samples differ considerably due to the fact that in one area the dominant economic activity is small businesses while the other it is clerical employment in the city centre. The samples also differ because in al-Asher the economy is far more reliant on that of Cairo as a whole than that of Kerdasa. The fact that there is a large number of small and craft businesses in Kerdasa makes it satisfy more of the macro sustainability indicators than al-Asher. This excludes the indicator of economic performance, which is not measured.

Environmental indicators show higher satisfaction in Kerdasa as a result of the existence of small craft industries, which are usually far less pollusive than large industry. Another was the existence of local economic activities and many services, which caused the local people to use the automobile less. Another important reason is that the consequences of not paying attention to the environment they live in ultimately falls on them. This encourages people take more care in how they live. Recycling occurred in some ways not only because it was a good way to save money sometimes (reuse of building materials), but to take the most advantage out of every resource to be found.

Social goals are reflected far more in Kerdasa for the main reason that there is far stronger social cohesion between the population there than there is between the population of al-Asher. When it comes to quality of the built form there were good aspects in both samples as will be seen when observing the satisfaction of the different aspects of the built form.

The following are the translation of sustainability indicators purely into built form indicators as compiled in chapter 7.

9.10 Built Form Indicators of Sustainability

The following are the built form indicators of sustainability as translated from the macro goals discussed and as found in literature associating sustainability with built form. The

first 13 are the translation of the general goals of sustainability, and following 8 those directly identified from literature about sustainability in built form.

9.10.1 Segregation Between Poor and Affluent

The building system of making a master plan where areas are allocated for different apartment sizes is a vehicle of segregation itself. This is an inherent flaw in any master plan. Designing a master plan works to define a certain social group in a geographic location through determination of the size and cost of the property. The system of the formation of the built environment in Kerdasa does not promote segregation (9.5.2). Variable (8.5.3) indicates al-Asher sample is largely employed in office and clerical work. In Kerdasa employment is more diversified between clerical and manual labour. Although employment does not mean affluence, it does indicate to an extent social groups. Assessment of the income of the samples was not made because it would not have been possible to gain accurate responses from respondents in both samples. But the two samples where chosen based of a perceived similarity in the level of affluence in both areas. From observation, it can be said that population in Kerdasa is more diverse and less segregated.

9.10.2 Provision of Shelter

What is addressed here is if the system of providing shelter is appropriate. One system is a state managed and initiated housing scheme, the other a completely locally controlled organic system of growth. The single most important difference between them is that one is subsidised while the other is not. The affordability of each to the resident is not easy to assess in Kerdasa because of different land prices within the settlement. In al-Asher subsidies made property more affordable, but still to many people they were not. Gradual growth of the dwelling accommodating the growth of the family makes it easier to finance in Kerdasa. At the same time it enables the growth of space with needs, where in comparison there is constant complaint of the lack of it in al-Asher. In terms of provision of shelter the system in Kerdasa is more efficient and better, however help from the state in the form of subsidies seems to make al-Asher favourable to some. Yet it cannot be claimed that cost is less in al-Asher even after subsidies. The individual manages building for themself cuts down on much of the cost of the dwelling through eliminating much of the overhead and reuse of the building materials. The local system therefore seems more appropriate for providing shelter in Kerdasa and at a low cost.

9.10.3 Adequacy of Shelter for Nuclear Family

Gradual growth of the dwelling also makes it more suitable for the extended family making the home adaptable to the needs of the family and its gradual growth, as found in Kerdasa. This is completely the opposite in al-Asher. The small size of the dwelling and its inability to grow with the growth of the extended family makes it inhibiting to the creation of the family. Variable (8.5.5) and (8.13.5) show the size of the households and existence of extended families in both samples, reflecting the dwelling ability to encourage family living in Kerdasa contrary to al-Asher. Home and land ownership (8.5.7), which is higher in Kerdasa also, works towards this. Variable (8.5.8) shows that for many in Kerdasa a prime reason for living in the area is the presence of family and friends. While in al-Asher the price of dwelling seems to be the main reason. This is also reflected in open-ended responses, which indicate a satisfaction in Kerdasa is for living with family and friends. Much of the dissatisfaction in al-Asher sample is because of inappropriate dwelling area.

9.10.4 Spaces for Community Interaction

The identify of spaces for community interaction differs in both of the case studies. In Kerdasa these spaces are occasions halls, mosques, coffee shops, street, front and benches, as found in variable (8.8.8). The same indicator shows similarities in the identity spaces used for social interaction in al-Asher like coffee shops and the street, although the number of these spaces is less. Open-ended responses indicate a lack of such places and of recreational activities in both settlements. Such places as cinemas, youth centres, and green areas are reported to be lacking in both settlements.

9.10.5 Spaces for Community Forums and Meeting

These spaces are those used for communities to meet to solve their common problems. Since community co-operation does not exist in al-Asher, there are no such spaces. In Kerdasa it is expected that much of these spaces are the same as those for social interaction. However spaces used for discussing community concerns are more associated with the homes of elders, mosques, or mastabas. These spaces are used when there is something that is more serious to discuss. All these spaces are also mentioned as spaces for social interaction.

9.10.6 Spaces for Cultural Functions

Spaces dedicated for cultural functions can be seen in occasion halls that are specifically used for such occasions where weddings are held. Streets also have cultural functions

held in them when they are decorated for these activities. In Kerdasa, there is a one-day market place, which is kept in a central square inside the settlement. This market is in itself a cultural activity, which has allocated to it a space in the urban form. This area is also used for celebrations in some cultural events taking place area. The Monday market is mentioned in open ended responses as one of the positive aspects of the settlement that make it good to live in supporting the importance of the urban element at a cultural dimension. Al-Asher area does not have spaces were unique cultural activities can take place.

9.10.7 Urban Form Reflective of Cultural Norms and Identity

In this indicator attempts to identify whether the urban form is reflective of the culture and identity of the local community and not necessarily the existence of spaces to accommodate cultural needs [indicator-(9.9.7)]. There is much that can be seen in Kerdasa that is a reflection of cultural norms. How buildings are built in relation to each other and the norms that govern them do this. Others can be seen in prohibiting the opening of windows or doorways opposite to each other, reflecting an important local cultural norm in the form of privacy. Inside the dwelling there is usually a central court that is open to the sky. The internal layout of the dwelling has a number of types that are specific to the settlement. They also have unique external decorations that reflect local identity. Home identity (8.6.14) and neighbourhood identity (8.7.13) support this indicator and reflect in Kerdasa more than al-Asher.

9.10.8 Quality of Urban Form

Evaluating the quality of the urban form is an indicator that took a large part of the survey questionnaire because built form is the research area. This is why there are almost 40 variable that are dedicated to the quality of built form. One of the primary goals to the study is to see whether organic growth creates better built form than a pre-planned centralised system through evaluation of the satisfaction of different variables of urban form. Quality indicators are divided into dwelling variables, neighbourhood variables, and settlement variables.

Fig:8.30 shows the results of the samples satisfaction towards different criteria. The majority of the criteria showed higher satisfaction levels in Kerdasa of up to 20%. The variables that did not show higher satisfaction in Kerdasa are internal water supply and structural quality. Higher satisfaction can be explained to some extent because the form is created by the dweller, and therefore any flaws are his. Satisfaction is much higher

and in a larger number of criteria. The results indicate also observation of both forms indicates that the form in Kerdasa is more satisfactory to the needs of the individuals than al-Asher.

Fig:8.31 shows satisfaction results in both samples to neighbourhood criteria. Most variables favour Kerdasa. Three criteria show higher satisfaction in al-Asher. Those are pollution, central water system, central electricity, and street paving. Most criteria favoured Kerdasa to an average 20% higher. Overall satisfaction with the neighbourhood also proves to be significantly higher in Kerdasa, while in terms of infrastructure quality, al-Asher shows higher satisfaction. Settlement variables in Fig:8.39 show that crowding and built environment satisfaction are similar in the samples while the criteria light / shade shows 30% higher satisfaction in Kerdasa. It is notable that while the sample in Kerdasa complained of narrow streets; this also created a much higher satisfaction in the light and shade variable. In all there is much higher satisfaction Kerdasa towards criteria of built form than there is in al-Asher. Which means that the urban form is more suited to peoples needs and therefore the system of creating the built environment in itself. This indicator makes an important statement towards the quality of the built form in both settlements.

9.10.9 Structuring Economic Activity in Built Form

What is meant by economic activity in this indicator is both services and production activity like workshops found inside the urban environment. There are a number of variables that measure the existence of economic activity and satisfaction with it. In al-Asher there is no mixed use in the original design of the master plan, rather a group of central areas with commercial property. In Kerdasa mixed use is very common where an individual can open any activity as long as it does not cause harm to anyone living close. Variable (8.9.1) defines both samples preference towards mixed use. The Variable shows that in Kerdasa there is stronger preference to mixed use. Variable (8.9.2) indicates that the Kerdasa sample has the ability to reach agreement on those activities permitted. While variable (8.11.2), indicates knowledge of the existence of norms governing economic activity among the Kerdasa community. Variable (8.8.3) shows the relation ship between the home and work in each settlement. In conclusion, the Kerdasa sample has a higher mixing of activities within the urban form and a stronger preference towards it. This is helped by the existence of norms that govern the economic activities and strong community co-operation.

9.10.10 Reduction of Use of Automobile

Use of the automobile is very much related to the previous indicator. There are two major reasons for its use. To find ones daily needs, and as transport to work. Variable (8.8.1) shows the modes of transport used to find daily needs, and variable (8.11.1) shows the need for transport to obtain daily needs. In both samples the prevalent mode is walking. However the use of the car is much higher in al-Asher where is also high use of the bus. In Kerdasa much of the use of the car and bus is replaced by cycling and walking. Variable (8.8.2) shows the situation for transport used to go to work. It shows an equal level of the use of the car, strong use of the commuter in al-Asher and many walking to go to work in Kerdasa. Again indicating a better use of more environmentally friendly modes of transport in Kerdasa, and therefore a reduction of the use of the automobile.

9.10.11 Appropriate Sewage Treatment Infrastructure

From data gathered, there is no sewage treatment in the Kerdasa sample, while there is in a good sewage treatment system in al-Asher. This makes this indicator more favourable to al-Asher. However, satisfaction with the sewage system is higher in Kerdasa. This is because the quality of sewage system is associated with pipe clogging and surfacing of the wastewater. This is a problem in al-Asher that is not found in Kerdasa because they use seepage tanks that do not clog. But there is a concern in the Kerdasa for the quality of their ground water which is deteriorating and which is used often by them. This makes the sample more concerned with the provision of treated water supply, and therefore they show less satisfaction with their water supply. Variables (8.7.8) and (8.7.9) back up this explanation.

9.10.12 Reuse of Building Materials

The reuse of building materials has no variable allocated to it in the survey. Observations indicate there is a strong organised system of reuse of building materials. Materials used are varied, where sometimes there is actually a reuse of bricks. Sanitary facilities are commonly reused. Other elements are doors and windows. There is no reuse in al-Asher of building materials because the community does not undergo building itself, and neither is the state committed to recycling. Reuse works well towards the lowering of the cost of the dwelling [observe (9.4.3-2) Building Waste].

9.11 Built From Indicators of Sustainability found in Literature

The following are those indicators directly linking urban form to sustainability found in literature.

9.11.1 Urban Density

Urban density achieves both a reduction of car use and at the same time maintains vitality in the urban environment. It can also increase safety by making the urban form more inhabited, at the same time increasing also social interaction. Variable (8.5.9) shows the calculated densities of both built environments. Results show a slightly higher density in Kerdasa than that of al-Asher. This means that Kerdasa satisfies this indicator more than al-Asher. However the difference is not a high one. It is important to note that much of the open space in Kerdasa is private, while in al-Asher it is public. Another important factor is that the calculations only concern internal neighbourhood streets in al-Asher, which means that the density found might be smaller than calculated. Density in Kerdasa is not small, because it was important to make use of the land properly and drive costs down.

9.11.2 Mixed Use Forms

As mentioned in (9.7.10), mixed used if far more prevalent in Kerdasa. Variable (8.9.1) shows sample preference towards mixed use, and (8.8.3) shows the relationship between home and work in both samples. Mixed use is meant to reduce use of the automobile and create a stronger vitality in the urban environment. From observation of both areas, that does seem to be the case where parts of Kerdasa remain vibrant to early hours of the day. Most streets will have a shops or workshops. This is not the same in al-Asher.

9.11.3 Alternative Energy Use

Both samples do not satisfy this indicator. In the case of al-Asher, energy provision is the responsibility of the state. In the case of Kerdasa, the community does not have the ability or knowledge to use alternative energy. The only indication of the use of an alternative energy is the burning of hay and garbage as a method of heating homes found in Kerdasa. Also the use of passive solar energy is made effectively through the use of internal courts in dwellings. In some cases there is a use of bio-gas, but it is not used to a great extent. The community will use alternative energy if it proves feasible to them, and if they have the knowledge.

9.11.4 Co-operation and Management in the Built Environment

This indicator is related to that of control over the management of the built environment discussed earlier. Management in the built environment can be found towards local infrastructure, streets, and other public places like a market place as found in Kerdasa. The creation of owner unions in some apartment blocks in al-Asher is a form of

management of an element of the urban environment. Apartment owners co-operating to make extensions to their apartment block is another strong form of co-operation and management. In Kerdasa co-operation and collective management is very common. Because the built form in the Kerdasa is organic, there must be co-operation to enable it formation. The existence of building norms demonstrates this co-operative system of control. The more obvious facets of community co-operation and management are how streets are maintained, where each individual is responsible for the area adjacent to them. Also a garbage collection system initiated locally. The Monday market is another example of communal management. These three examples are ones that need a lot of co-operation and management, and a community ability to work together. The most important facet of community co-operation must be the norms found that regulates building. The following variables demonstrate co-operation in built form; variable (8.10.13) shows those elements of urban form that are locally managed, existence norms governing building (8.10.6); community ability to maintain infrastructure (8.12.4); and infrastructure maintenance (8.10.9).

9.11.5 Street Calming and Pedestrian Friendly Streets

Al-Asher form does not encourage the pedestrian or discourage use of the automobile. Rather the design encourages accessibility and free flow of traffic. This is done through an iron grid design and through use of wide streets with large central curbs. In Kerdasa, the urban form does not encourage use of the automobile either intentionally or unintentionally. This is so because streets are very tight and narrow and are not straight. Streets are mentioned as spaces for social interaction that indicates that they are pedestrian friendly. At the same time, we must mention that the narrow streets are often mentioned as source of nuisance in the open-ended questions. There are no variables that directly relate to this indicator. However, variables relating to the use of the automobile will indicate that the urban form does not encourage the use of the car.

9.11.6 Architectural Distinctiveness

Architectural distinctiveness and identity might seem as a luxury to residents of both settlements. This is because residents are not affluent and built form is generally poorly finished. Variable (8.6.4) shows the responses of the samples to home identity / appearance, and variable (8.7.12) and (8.7.3) shows responses to neighbourhood identity / appearance. Satisfaction with appearance is higher in Kerdasa than in al-Asher. It might be expected that the population in Kerdasa is proud of what they have made in terms of its appearance and therefore their perception of satisfaction higher. Observation

of al-Asher will indicate that identity was not a priority in the design where architectural forms are extremely repetitive. In Kerdasa form is diverse. Appearance is governed by the ability of the owner to spend on the quality of the finishing and to bring the built form to completion depending on the state of his finances. Appearance will also depend on the management and cleanliness of the street environment. The identity of the neighbourhood is determined in terms of whether or not there are any distinctive features. In Kerdasa organic form ensures there will never be any two buildings, streets or neighbourhoods that are the same. What can give identity to local architecture are the plans and layouts of dwellings. Other features that transform the local identity are the painting of certain drawings on the outside walls of the dwelling. Others maybe the use of mud to build sometimes, building heights, or methods. In all dwellings are more distinct and have a stronger sense of identity in Kerdasa than can be found in al-Asher.

9.11.7 Energy Conservation

There are no local strategies in both of the settlement for energy conservation applied by the state. The low affluence of the samples makes it important for them to conserve energy in order to reduce expenditure. The only indication of energy conservation can be found in Kerdasa, where garbage and weeds are burnt to provide heat to the home, thus decreasing the need for energy. Another form of energy conservation is identified in the use of straw as a heat insulator on roofs. Also the appropriate use of daylight observed in the use of internal courts contributes towards conserving energy use in the dwelling. The compactness and density of urban form is a contributor to energy conservation because it maintains a temperature level that does not reach extreme highs and lows and therefore reduces ones need for heating or air conditioning in dwellings. Variables relating to ventilation (8.6.1-2) and daylight (8.6.5) support this indicator.

Control Indicator	Kerdasa	Al-Asher	Variables
Order System			
Local Authorities	relatively large level of control	Little control because part of Cairo	(8.10.1)
Phases of control			
Formation	Large powers of control	No powers of control	(8.12.1), (8.10.4-7), (8.10.1)
Management & Maintenance	Large powers of control	Average powers of control	(8.5.6), (8.10.10-11), (8.13.1-3), (8.10.8-9)
Adaptation	Large powers of control	Weak powers of control	(8.10.2), (8.10.3)
Norms	Strong local norms	No local norms	(8.10.6-7), (8.10.8)
Ability to Manage Infrastructure	Average ability	Weak ability	(8.10.9-10), (8.12.4), (8.13.3)
Economic Activity			
Diversity	Very diverse local economic activity	Less diverse activity	(8.5.1)
Local resources use	Economic activity makes use of local resources	No use of local resources	
Self-employment	Relatively moderate local employment	Little local employment	(8.5.3), (8.5.1)
Control over built Form	Large powers of control	……..	(8.11.2)
Knowledge & Tech			
Transformation of knowledge	Knowledge transforms through local builders, owners and community	No local building knowledge	(8.12.2), (8.12.3), (8.12.1), (8.12.4)
Use of Local knowledge & materials	Local knowledge is in the hands of builders who use both local materials and exported materials	……	
Forms of Technology	Use of simple infrastructure technology	Infrastructure technology is dependant is provided by the state	(8.12.4)

Table 9. 1 Control indicators observed in the case study

Sustainability Indicator	Kerdasa	Al-Ashser	Variables
Economic			
Economic Performance	Economy more local, therefore local economic performance is substantial	No local economy	(8.8.3)
Sustainable Economic Activity			
Appropriate Technologies	Use of small scale technologies	……	
Environmentally friendly products & materials	Products and materials used are natural and environmentally friendly	……	
Products that meet basic needs	Products satisfy this goal	……	
Low waste production	Products satisfy this goal	……	
Good working conditions	Dependant on situation, however local pay is low	Working conditions are relative to each case, but more clerical work suggests good conditions	
Energy Efficiency	Energy efficient	……	

Sustainable Activity			
Local Self-reliance	Substantial local economy suggests a level of local self-reliance	No local economy	(8.5.1), (8.5.3), (8.8.3)
Community Organisations	Non found	Non found	
Sustainable Employment	To an extent employment is sustainable	Employment mostly not local	(8.5.1), (8.5.3)
Economic Development plans	Non found	Non found	
Environmental			
Air			(8.7.5)
Heat	Little heat pollution because of little use of the car	Cars within the settlement itself are not many, reducing the build up of heat	(8.8.1), (8.8.2), (8.8.3)
Particulate	High amount of particulate because streets are not paved	Moderate particulate pollution which is resultant from the dumping of building materials	(8.14.1-7), (8.7.5)
Oxide	Low car emissions and the inexistence of large scale industry reduces oxide pollution	Although there is high use of the automobile to get to work, there is low local oxide pollution because car ownership is not high and because there are no large scale industries	(8.8.1), (8.8.2), (8.8.3)
Water / Liquid			
Wastewater Treatment	High amount of pollution resultant from bad wastewater treatment affecting the ground table water	Waste water treatment is provided by the state adequately	(8.7.8)
Heat	Not recognised	Not recognised	
Industrial	No heavy industry	No heavy industry	
Solid			
Household Waste	Household waste disposal is managed by local people appropriately	Household waste disposal is managed by the state inappropriately	(8.7.4)
Building Waste	Building waste is managed locally and appropriately	Building waste is dumped illegally	(8.7.4)
Industrial	Not recognised	Not recognised	
Social			
Equality	Local provisions made for women but not disabled	State policy did not recognise this	
Equity	There is equity in that there is not segregation	There is segregation between low income and higher income families	(8.5.3), (8.5.4), (8.13.1,4), (8.7.3)
Environmental Awareness	There is local environmental awareness in terms because it is originally an agricultural community	There is a moderate environmental awareness regarding local pollution	

Eradication of Poverty/ provision of shelter	There is local co-operation to help each other, also provision of shelter is a more simple task	Provision of shelter is through the state and difficult to acquire. No local co-operation between individuals	
Health	No central policy,	No central policy,	
Role of family	Very strong role of the both direct and extended family unit	Moderate role of the direct family and little for the extended family	(8.5.5),(8.5.7), (8.5.8), (8.13.5)
Role of Community	Very strong role of the local community	Very weak role of the local community	(8.13.1-5), (8.7.3), (8.8.8)
Political Rights & Participation	Weak political rights, however strong participation in the formation of the built environment	Weak political rights and participation in the formation and management of the local environment	(8.8.8), (8.13.3)
Social & cultural values	Strong social and cultural values which are local reflected in the built form	Social and cultural values are not reflected in the built form	(8.8.8)
Quality of life	There is relative satisfaction among residents of the settlement identified in open-ended questions	There is relative dissatisfaction among residents identified in open ended questions	
Built Form			
Forms sensitive to needs of women &disabled	Women are recognised in their needs within the home, while disabled are not recognised	Women are not recognised nor are disabled	
Segregation	There is no segregation reflected in the urban form	There is segregation reflected in the urban form	(8.5.2), (8,5,3)
Provision of shelter	Shelter is provided more simply because of ownership of land	Provision of shelter a more difficult task	
Adequacy of shelter for extended family	Shelter accommodates the extended family perfectly	Shelter does not accommodate the extended family at all	(8.5.5), (8.13.5), (8.5.7), (8.5.8)
Spaces for community interaction	Relatively large number of spaces for community interaction found in the urban form	Few spaces for community interaction, mostly found in coffee shops	(8.8.8)
Spaces for Forums	Community forums may take place in homes of elders, or mosques	No local forums	
Spaces for Cultural Functions	Adequate amount of spaces for cultural functions provided locally	Very few spaces for cultural functions	
Form reflecting cultural norms & local identity	Form reflects cultural norms and local identity vividly	Form does not reflect cultural norms or local identity	(8.6.14), (8.7.13)
Built Form accommodating economic activity	Built form accommodates local small business activity	Built form not designed to accommodate economic activity	(8.9.1), (8.9.2), (8.11.2), (8.8.3)
Reduction of the need of the automobile	Mixed use and moderate employment opportunities reduce this need	Single use and lack of local economic activity increase the need for the automobile constantly	(8.8.1), (8.11.1), (8.8.2)

Appropriate infrastructure	Local infrastructure or poor quality and pollutes ground water	Infrastructure provided by the state is supportive to well being of local people	(8.7.8), (8.7.9)
Recycling building materials	Building materials are reused locally	No reuse of building materials	
Quality of Urban From	Local satisfaction with urban form is high	Local satisfaction with urban form is low	(8.6.1-13), (8.7.1-14), (8.8.1-9)
Sustainable form			
Urban Density	Moderate	Moderate	(8.5.9)
Mixed Use Forms	High level of mixed use	No mixed use	(8.9.1), (8.8.3)
Alternative Energy Use	Not evident	Not evident	
Co-operative management	Local co-operative management very high	Very low local co-operation	(8.10.13), (8.10,6), (8.12.4), (8.10.9)
Street calming, Pedestrian friendly	Streets and walkways more pedestrian friendly and discourage car use	Streets encourage the car more than the pedestrians	
Architectural distinctiveness	Architecture relatively distinct	Architecture has no identity	(8.6.4), (8.7.12), (8.7.3)
Energy conservation	Urban form more conducive to energy conservation	Form does not help the conservation of energy	(8.6.1-2), (8.6.5)

Table 9. 2 Sustainability indicators observed in the case study

CONCLUSION

CONCLUSION

Review

This research reflected the researchers concern with observing the powers and forces that shape the built environment rather than its final outcome. Political and economic powers have shaped our cities for a long time. Whether this was done positively or negatively, how form came to be is a more important issue. At the same time the researcher holds a deep belief in understanding the human ecological system as a way to understand the built environment that is transformed by it. Built form then becomes a process and not a final outcome. This process constantly adapts to environmental conditions. Only within this context can the form of the built environment be properly understood.

The application of General Systems Theory and Structuralism helped in understanding the processes that take place within the human ecological system. It also helped identifying the processes that take place in *instrumental* systems of planners and designers alike. Comparison of both showed their contributions to the built environment. It also recognised the concept of control as an inherent characteristic of the human ecological system which can also be seen as the *local environment system*. In the case of the *instrumental systems*, control is recognised in the systems designer and in the powers allocated to different parties shaping built form. Systems analysis enhances the understanding of control in a systems perspective, which becomes a defining characteristic of the system itself. At the same time, functions of local control are recognised for their ability to transform the concept by defining parties and powers (the prime components of control). Local order system, economic activity and knowledge and technology are defined as the three major functions of local control. Each of these functions has the ability to define different parties and powers in the built environment and therefore transform control accordingly.

Local order system is the first function of control and can be seen in two ways: that of state building regulation and policy as applied to the built environment and that of local norms and conventions found in traditional communities. This function identifies the powers of user, owners, and controllers. Each is a party with a consequent claim defined by law or local convention and each is able to shape built form according to the powers it has.

Economic activity is the second function of local control. Its significance stems from the fact that a major component of the built environment is found in economic activity whether in services or production sectors. It also defines parties and powers like the previous but in relation to the economic activity only. The third function is knowledge and technology. In this case knowledge is seen as the power to shape built form as vested in the builder, designer and user. Each contributing to the final outcome through the knowledge they have transforming through time. At the same time technology defines who has the ability to manage infrastructure.

The role of sustainability in this study refers to its ability to assess and evaluate the built environment. It is a wide ranging concept that attempts to become holistic by defining as many aspects of human well being as it can. It is philosophically linked to ecological systems thinking, defining the environment as a process through time where human activity is a vital component. It provides a suitable evaluation method to be used to assess local control as defined in the study, while at the same time it is internationally recognised.

Research Methodology

In order to observe the theoretical framework of the study, it was necessary to apply it in two comparative case studies. A list of indicators that defined each of the three introduced functions of control was compiled during the theoretical discussions. At the same time a list of sustainability indicators is identified from the literature on the topic. The indicators were applied to two settlements. One is organically formed and has a strong internal system of norms and conventions, a more distinct local economy and local building knowledge. The second is a state executed and managed settlement where users had no power to define form. In each case control and sustainability indicators were identified and discussed in relation to each other. A final outcome in terms of local control and sustainability was derived, where the effects of local control as a whole on sustainability was identified while at the same time internal relationships could be observed. The case study was conducted using mostly on site observation and an extended survey questionnaire including a list of both closed and open-ended questions. This set the background for a practical discussion in a real setting encapsulated in two settlements in Egypt.

Survey Outcome

The application of the survey indicators reflected on many aspects of each settlement. These can be categorised into four that relate to the quality of built form, social qualities of both communities, sustainability and control.

The indicators relating to the quality of the built environment were divided into those relating to the dwelling, to the neighbourhood and urban form, and those relating to the overall settlement. Satisfaction with the dwelling was significantly higher in Kerdasa in most variables with the notable exception of *internal water system*., The high level of satisfaction in Kerdasa is also because both land and the built form on it are part of the property. The ability of the home to expand and accommodate the extended family is another very important contributor to this higher satisfaction as seen in the results of the open-ended questions. Variables for satisfaction with the the neighbourhood and settlement are also higher in Kerdasa in all but the provision of infrastructure and pollution. In general, organic built form in Kerdasa that it is defined locally was found to be more satisfactory for most variables except those relating to central facilities and infrastructure where in al-Asher these were better provided by the state.

Social variables tested overwhelmingly indicate a higher level of social cohesion and better relations between the individuals of the Kerdasa sample and therefore the community it represents. Close community ties and kinship between its members is a major contributer to social cohesion. Because individuals and their families lived in the same place for generations the social environment was significantly stronger. In al-Asher there is weak social cohesion propounded by an inability of the community there to co-operate. Open-ended questions identify the strength of the social dimension in Kerdasa far more than al-Asher.

Many indicators of sustainability were observed in both settlements. In Kerdasa there is a higher extent of mixed land use accompanied by a use of more environmentally friendly modes of transport such as the bicycle and walking. In al-Asher there is less mixed use and the bus is the dominant means of transport because of its relative cost compared to having a car. More people are found to be self-employed locally in Kerdasa thereby decreasing the need for transport. Building density in both settlements is very similar and relatively high.

The cohesion of the local community and a higher level of co-operation contribute to sustainability as they do to the social dimension in the survey. A higher level of pollution was perceived in Kerdasa than in al-Asher. However observation indicates more cleanliness and management of the street environment in Kerdasa. In terms of economy, although there is significant local self-employment in Kerdasa, most of it is supplementary to another form of employment. This means that in both case studies the local environment does not support enough employment and economic activity. The social dimension of sustainability was satisfied to a greater extent in Kerdasa, while economic and environmental dimensions of sustainability fluctuated. In general the Kerdasa sample reflected more sustainability indicators than al-Asher.

The final category of indicator observed, which is that of control, was developed during the theoretical discussions. The organic process of formation of the built environment against central state design and contruction processes, differentiates both case studies. In Kerdasa there was a *local order system* based on norms and conventions as defined in the theoretical discussions. This system governed all members of the community and defined their rights. Arbitration in cases of conflict was taken up by local family elders and was accepted by local authorities as reliable. These local norms and conventions for building were simple and were guided by Islamic and local culture. Some of these norms are directly related to the built environment. The building process in Kerdasa was based on local knowledge and methods mixed with new methods. They maintained in some places the old ways of building as seen in the form of the dwelling, while new methods that incorporated the use of reinforced concrete are now adapted locally for their durability and ability to provide more space for the extended family. Ownership of both land and the property on it also gave more freedom in defining shape. In this case the owner was responsible for the management of the building process whereby he would employ local builders without the use of an architect. This process was gradual and depended on the need for new space and available financial resources. In al-Asher users and owners of apartments had only the freedom to occupy them. A master plan design was applied were there was no input for the future user. The design incorporated architects and planners using modern principles and building methods sometimes using prefabricated units. There was no local system of norms and conventions and there was no significant local economic activity. The management and maintenance of the built environment is the responsibility of the state in contrast to the

situation in Kerdasa where much of it was locally maintained. In all control indicators were recognised to a far higher degree in Kerdasa than they were in al-Asher, justifying the choice of the settlements.

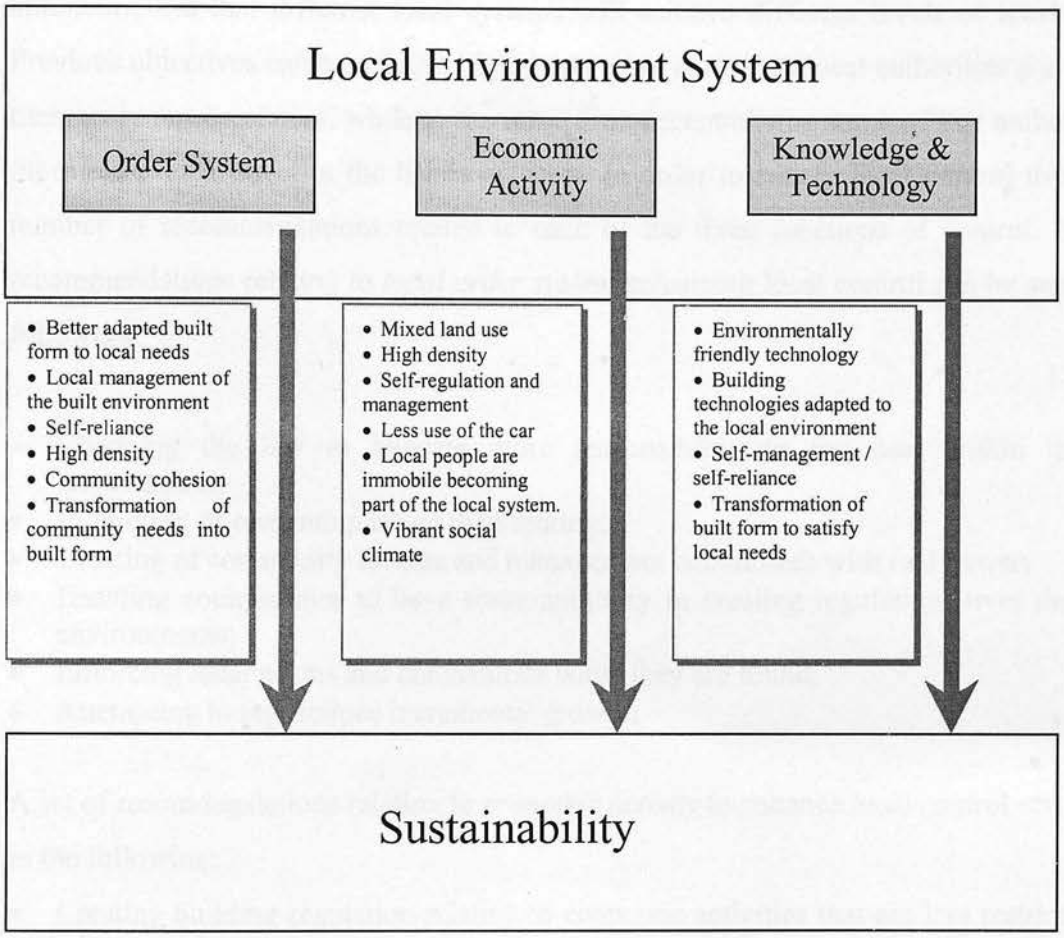
Survey Conclusion

The outcome of the survey indicates that in the chosen case studies, sustainability did correlate with local control as defined in the theoretical part sections. The case study application also identified secondary relationships between individual indicators. The strength of local community relations and its correlation with local control and co-operation is evident. Open-ended questions often indicated the strength of the relationships between individuals in Kerdasa as opposed to those in al-Asher where they were reported to be bad by the respondents. This correlated with a higher ability to manage their surroundings at Kerdasa, while in al-Asher state intervention was often suggested as the solution to local problems.

The strength of local social ties is manifested in the local community's ability to form a system that can transform its physical environment to satisfy its needs. It forms a very effective and reliable system that has the ability to manage and shape its built form through time. In al-Asher the local authorities and the state, as a system were responsible for the management of the built environment there. This organic social system of Kerdasa, which at the same time corresponded to an organic urban form, can be seen as a single body that took up various functions where the state was lacking in terms of effect and reliability. It had an inherent internal system of control representing the *local environment system,* while in al-Asher the management of the settlement is external of the local environment and represents an *instrumental system*. Internal control in Kerdasa was enhanced by the existence of locally owned economic activities, local building knowledge giving them the ability to shape their built environment, and a local system of norms and conventions. All of these influenced the built environment in different ways where the outcome was a higher fulfilment of sustainability indicators.

Each of the three functions of local control had the ability to contribute to sustainability in different ways. *Local Order System* increased local cohesion and self-management. It also allowed a transformation of local needs into built form and at the same time allowed for a

high-density urban form. *Local Economic Activity* allowed for mixed land use, decline of the use of the car, a more vibrant social climate, and for the local community to have the ability to build their relationship with place. *Knowledge & Technology* allowed built form to adapt to the local environmental conditions and to people's needs, while enhancing their ability to manage their built environment.



Outcomes

The observation of the contrasting qualities of both settlements and, more important, the systems that developed them, identifies many positive qualities of the organic system that have been otherwise overlooked today. These qualities relate to the internal control mechanism inherent in the system. In order to achieve a system of local control, it must satisfy the following objectives:

- Centralised control must be replaced with co-operative local control;
- Control over any element of the local environment must correspond to its users;
- The system should allow for the possibility to delegate powers of control to individuals that are not necessarily respective users by choice of the users themselves;
- There must be a hierarchy of bodies each at the appropriate level to manage elements of common use.

It should be understood that it would be difficult to achieve absolute local control or *autonomy*, but that different local systems will achieve different levels of local-control. Previous objectives can be achieved by giving more control to local authorities and making them truly representative, while at the same time decentralising some of that authority to a more basic local level in the hands of users. In order to satisfy local control there are a number of recommendations related to each of the three functions of control. A set of recommendations relating to *local order system* enhancing local control can be seen in the following:

- Changing the law to allocate more responsibility to the user within the built environment;
- Promoting of ownership rather than renting;
- Creating of community forums and management committees with real power;
- Enabling communities to have some authority in creating regulations over their built environments;
- Enforcing local norms and conventions when they are found;
- Attempting to reintroduce incremental growth.

A set of recommendations relating to *economic activity* to enhance local control can be seen in the following:

- Creating building regulation relating to economic activities that are less restrictive and allowing mixed use;
- Allowing for mechanisms whereby residents can alter regulation relating to economic activity;
- Laying down and monitoring pollution standards, and allowing the determination of these standards locally;
- Making a list of possible controls proposed by the state where by community organisations can decide on which and how to incorporate them;
- Promoting a stronger home / work relationship in design principles;
- Making a directory of technical and architectural solutions for reduction of different forms of pollution such as noise, whereby they can be applied to architecture.

A set of recommendations relating to *knowledge and technology* to enhance local control can be seen in the following:

- Encouraging the use of local methods and materials in building through state policy;
- Educating and researching into those methods through local learning centres;
- Allowing for the ability of individuals to design their homes, possibly through making available simple design and construction literature;
- Encouraging self-build schemes;
- Developing infrastructure technology that would enable it to be managed locally.

Achieving these objectives will enhance the contemporary built environment ability to become locally defined. This will allow local people using local knowledge and resources to transform their physical environment, to satisfy their needs and produce better solutions to local environmental problems. In this way it may be possible to achieve some of the positive qualities of the traditional organic built environment while at the same time accepting new methods and ideology depending on their suitability.

Implications for Professionals

The outcome of this study has a number of implications for professionals working with the built environment. These professionals are builders, architects, urban designers and planners.

The builder should have a background education of local building methods and resources. This will allow the builder to be able to choose the most effective methods to the local environmental conditions and local resources. This is not to say that newly developed methods and technologies are not be used. The builder should have the knowledge of both traditional local methods and more modern ones in order to have a choice of the most appropriate, thereby increasing the ability to satisfy the needs of the user. At the same time there should be more interaction between the user and the builder to better communicate the needs and preferences of each party.

The architect needs to maintain and improve the working relation he or she has with the user. The architect should attempt to satisfy the user before issues affecting personal artistic ego. This can take place by close collaboration with the user backed up by more user / designer briefing on the details of the architectural form. Of course the user is not always an individual. Sometimes the user is an organisation or group of people in which case communication between user and designer becomes a more complex and time-consuming issue. However the more time spent in user / designer briefing, the more the artefact will

satisfy user needs. In other cases where the user does not have a role in the design and building of the artefact, such as when commissioned by a developer, the designer must be able to assess the needs of the future user intuitively.

The urban designer is commissioned most of the time either by the state or by a developer. In these instances there is very little interaction between designer and users. In order to assess user needs, surveys are conducted. The user, in the case of urban design, is a large party that is represented by the state. In the case of a developer, the user party does not exist and the urban designer must assess user needs. The role of the urban designer can be improved by increasing research into the needs of the users, while at the same time the users must have the freedom to make more local adaptations to built form.

The role of the planner and planning in general is far too prescriptive and inhibiting to local adaptations in the built environment. The powers of the planner must be drastically cut back in order to enable more local control and adaptation. In many cases there is no need for the planner at all, where processes of incremental growth may be allowed to replace the role of the planner. The role of the planner should be no larger than prescribing for the state the resources that can be provided to local communities in order for them to shape their own built environment accordingly.

Final Outcome

Local control is a vehicle for adaptation in the local environment. This is exemplified in indigenous environments that have a capability to transform their needs into the built form. They use available resources of materials and knowledge that take very long periods of time to develop. The society and community that exists in such places are governed by local norms and conventions where each individual is part of the overall system. In this system each individual is able to adapt the individual dwelling unit to suit his or her particular needs and to the local environmental determinants of place. Since economic activity ownership in such a case is distributed among the community, its built form is also adapted to the needs of the activity itself. At the same time because economic activity was local this meant that the community did not need to relocate, thereby staying in the same place and developing their form.

In this way the local environment can be seen as a system. The first component of it is the natural physical environment, which consists of the natural topography and the wildlife on it providing resources for man. The second component is the people who inhabit the natural physical environment. The importance of this component stems from the ability of people to co-operate and transform their needs collectively. The third component is the man-made physical environment, seen in the built environment. From the local resources provided in the natural environment, local people are able to develop their built form. The built environment becomes a result of the interaction of people with their natural environment, where built form is the outcome of the adaptations of people.

Through the people that inhabit the local environment, different processes occur. When there are good social relations between the individuals of the community, good communication takes place between the individuals whereby there is an exchange of ideas and people exhibit qualities of co-operation and common purpose. Together they have the ability to form a larger unit or body with different internal functions. Such may be observed in different roles among individuals such as traders, builders, craftsmen, farmers and possibly designers.

This system must have internal control to enable it to adapt to its surroundings. This means decision making should be made by respective users. It also means that in relation to common elements in the built environment, decision making should be made co-operatively or by individuals with delegated authority that are close to the object in concern. In this way control becomes an inherent local quality and should not be imposed from outside. It is also an organic entity as seen in its social hierarchy and order, and sometimes in built form that is vernacular. Internal transformational processes allow it to grow and develop, continuously improving its surroundings and adapting to changes whether internal or external. Within it there is a deep structure of improving the quality of life of its individuals. There is both a synchronic and diachronic transformation of resources and needs, and a gradual adaptation.

The processes within this organic entity can only take place if it is not controlled by any external forces whatever the motives might be. It must be recognised that the potentials, of local control as a vehicle to manage the local environment effectively, are vast. This

understanding if incorporated will readdress environmental problems and make a shift from the central to the local. In this way it may be possible to effectively manage the growth and development of the built environment and realise its potentials.

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APPENDICES

Glossary of Terms

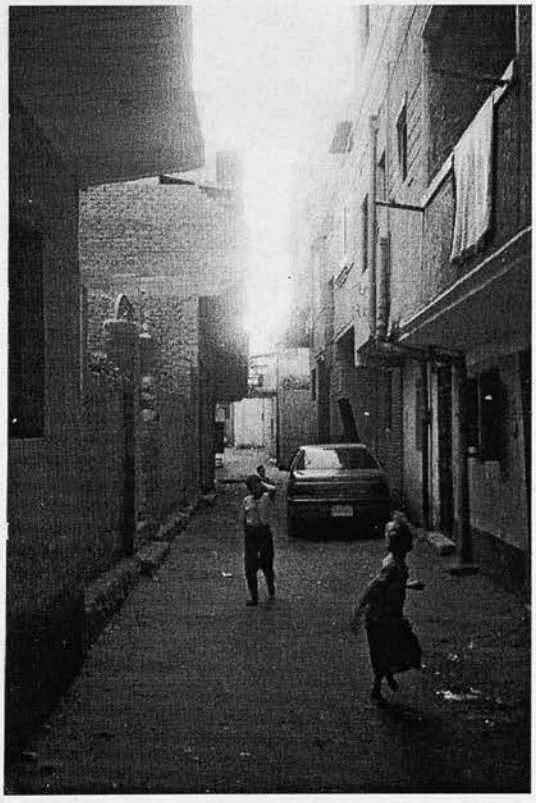
Built Environment	It is the interrelationship between man and his physical surroundings excluding natural physical surroundings.
Claims	These are the powers of control instated by the state to owners, users and controllers of property by law.
Community	It is a group of people having a large number of common characteristics and a sense of common purpose.
Control	It is a concept that defines the ability to shape different artefacts of built form by identifying its relevant parties and powers.
Culture	The behaviour and customs of a group of people, community, or population.
Culture System	It is the interface between man and his physical environment weather it relates to an individual or group or people or a population at large.
Economic Activity	It is that activity by which an individual or group of people earn a living.
Economy	It is the macro-climate in which opportunities for the creation of economic activities may develop.
Eco-System	It is a system that governs the relationship between a group of elements and their surroundings, generally associated with natural systems.
Environment	A relationship between a group of elements and their surrounding.
Functions Of Control	They are the factors that affect the transfer of control from the local to the central and vice versa (these are the postulation of this research).
Human Ecology	It is the study of man and his direct environment (man / environment relationship).
Indicators	A group of factors that identify a particular concept or paradigm.
Local Environment System	It is the overall local system constituting the physical environment: both the man made as seen in the built environment, and the natural physical environment; and the community inhabiting and adapting to the physical environment.

Mashrabia	Externally protruding wooden latticed windows that are found in traditional built form in the Middle East.
Mastaba	A built up seating area situated at the entrance of a dwelling where the head of a family relaxes and socialises with neighbours (commonly found in the Middle East).
Natural Physical Environment	It relates to all that is naturally found in the local environment including topography, vegetation, climate, etc.
Norms And Conventions	The behavioural adaptations of a group of people with each other and their surroundings.
Organic Built Form	It is a built form not planned or organised centrally by the state, but grows naturally through local norms.
Parties	A group of people defined by a common characteristic or power to control form in a certain way.
Powers	These are the external forces that shape a local environment.
Settlement	A built environment characterised by a well-defined boundary and a process of formation throughout its urban patterns.
Shoukhsheikha	An air vent situated on top of an internal court allowing the circulation of air inside a built form commonly found in the courtyard house in the Middle East.
State System	It is the systems by which the state can create, manage, and regulate the built environment; and is depicted by planning.
Transformation	It is the process of adaptation of the internal structure of a system to its direct environment through long periods of time, altering its physical form.
Urban Environment	It is the built environment observed at a more local level encompassing local streets, residential blocks, or other elements of local form. In it the relationship between residents their direct urban form can be identified.
Urban Form	It relates only to the physical form of the urban environment.
Vernacular Built Form	A Built form that is locally defined and is synonymous with organic built form.

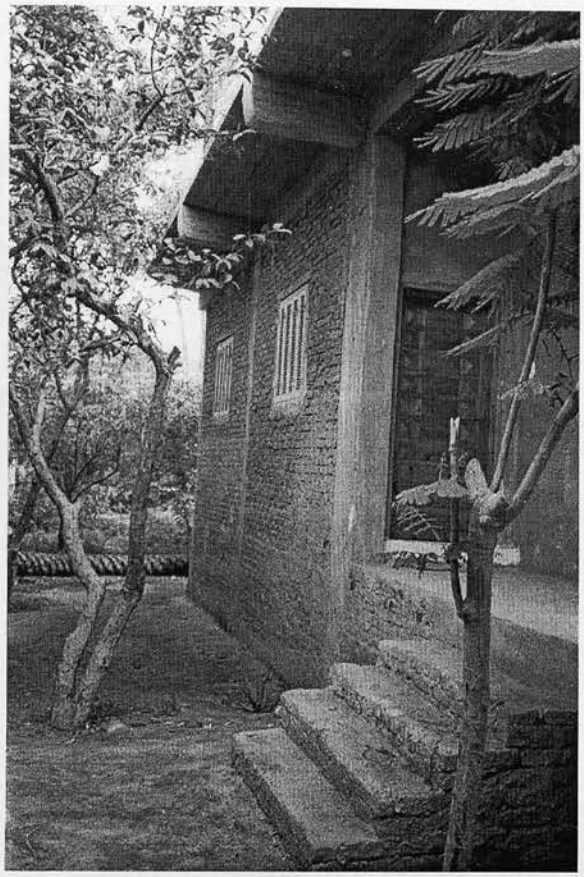
Photo Gallery

Kerdasa

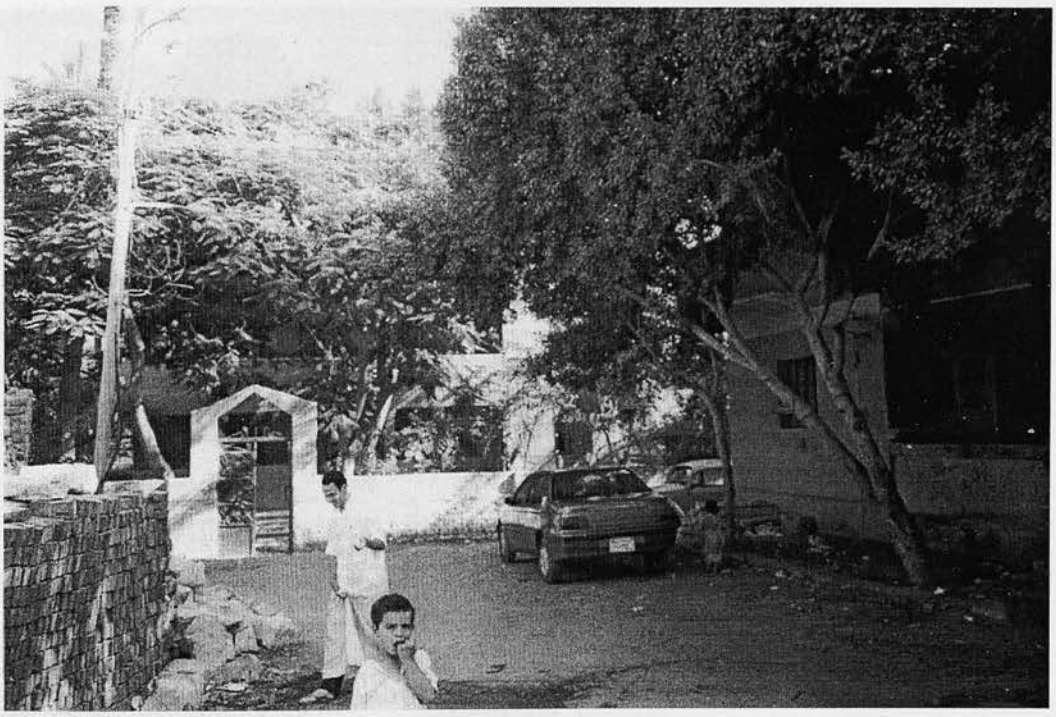
Overhead view of Kerdasa, reflecting the urban pattern of the town and the materials used in building.



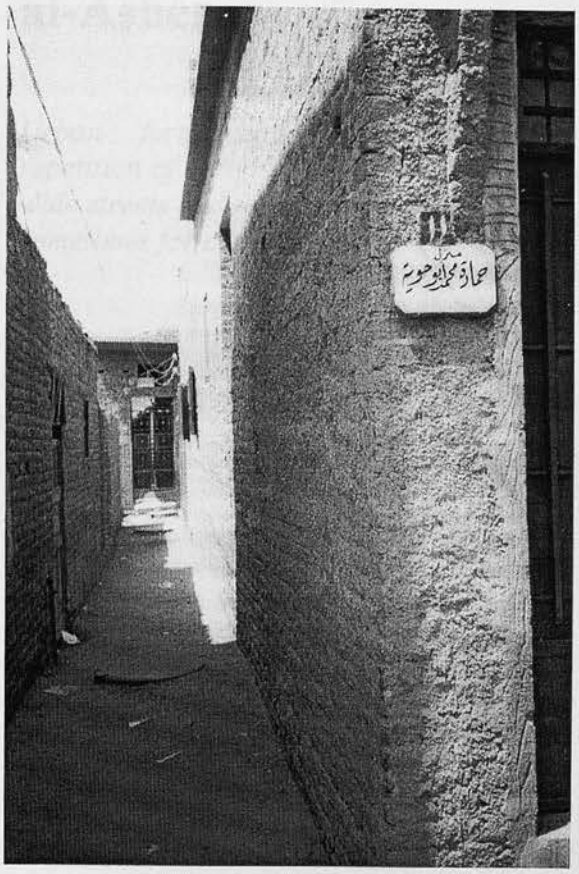
Narrow streets providing ample shade from the strong sun and a good playing environment for children while car access is difficult.



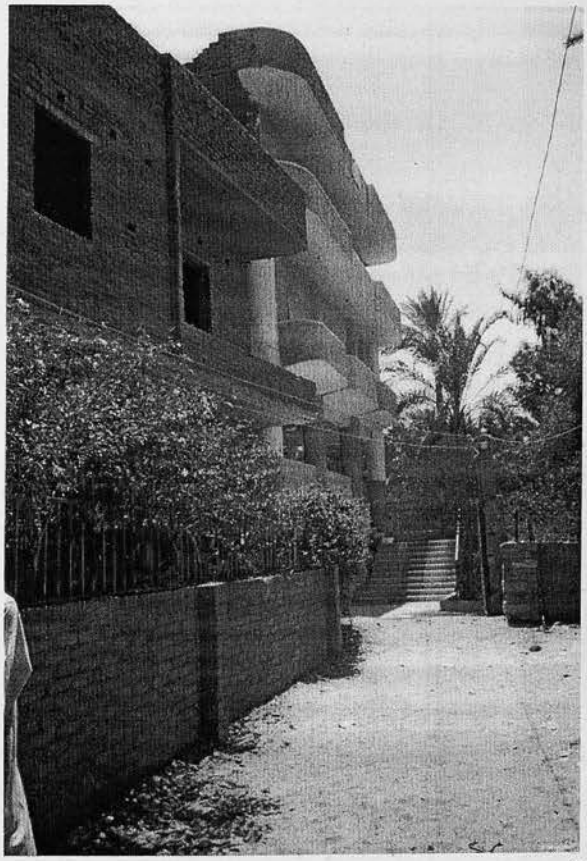
Private property where open space is saved for future extensions to the dwelling and used as a private garden in the meantime.



Planting trees is an important part of the buit environment both within private property and on the outside.



Extremely narrow streets where the sewage network has been installed.



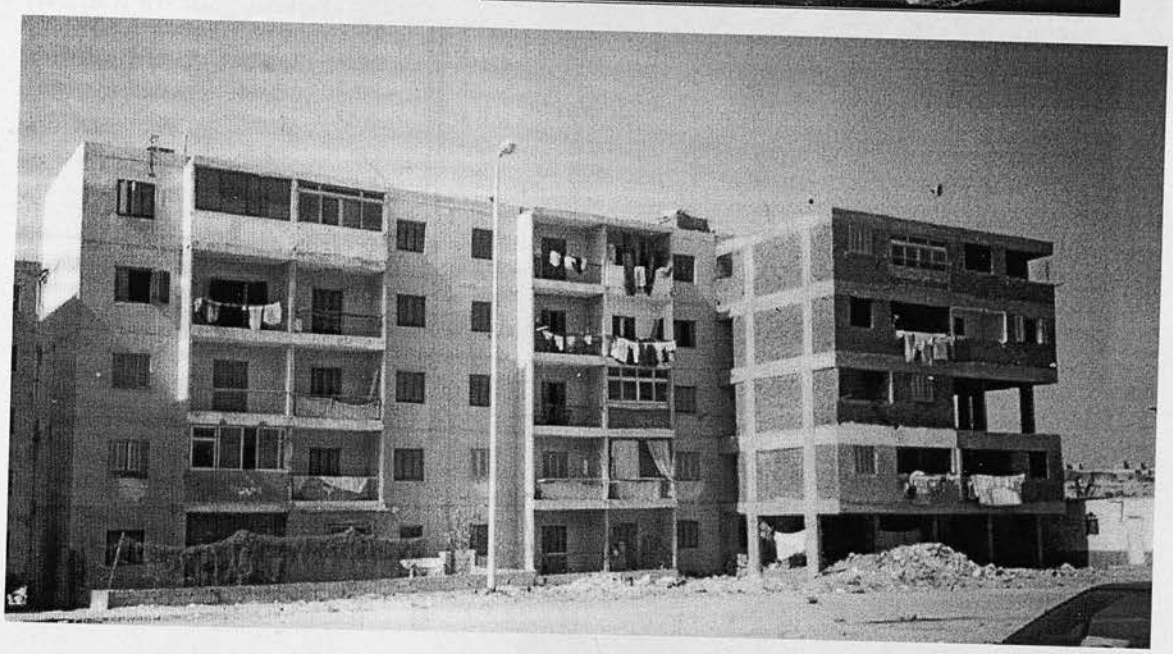
A local hospital that has been co-operatively constructed and managed locally.

al-Asher

Urban form in al-Asher reflecting repetition of design. Photo also reflects the wide streets and the use of the ground floor sometimes for coffee shops.

The appartment blocks with extensions that are built to increase space.

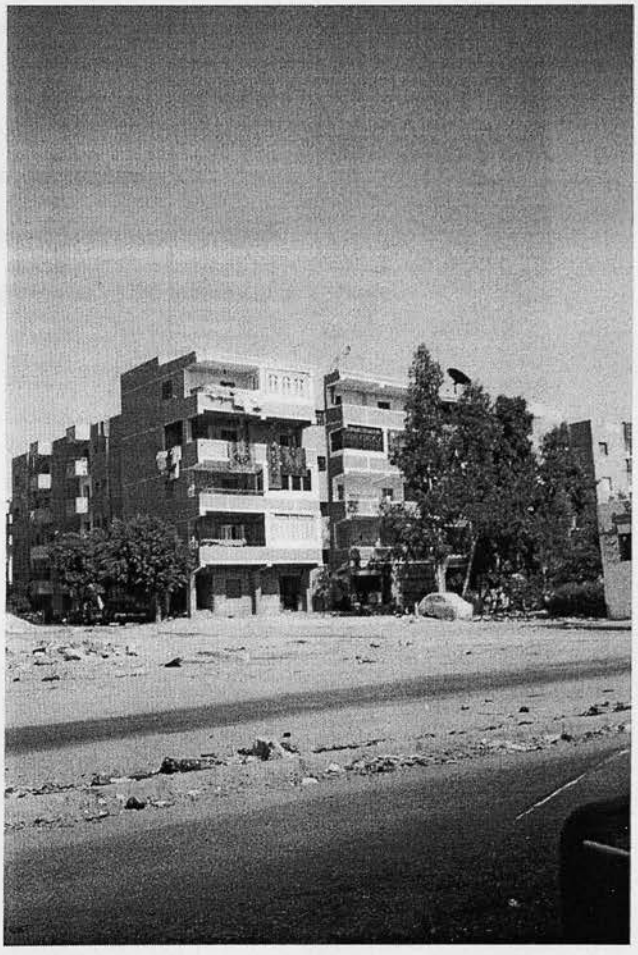
Often the extensions made can be of a far superior quality of contruction than the original.



Extensions that are made use a skeleton structure system, while the original uses prefabricated construction techniques.

A lack of street cleanliness is evident. At the same time private initiatives at greening in spaces that are annexed reflect a far better maintenance.

Extensions can sometimes be greater in size than the orginal apartment. People have adapted their environment to their needs when they live in it for long periods of time.



Survey Questionnaire

Background Information

Sex: ❒ Male ❒ Female

Marital Status: ❒ Married ❒ Single

Place of interview ❒Home ❒Work

Age of interviewee ❒ Under 20 ❒ 20-30 ❒ 30-40
❒ 40-50 ❒ over 50

Occupation of interviewee ..... Locally employed ❒ Yes ❒ No

Self-employed ❒ Yes ❒ No

Educational Level ❒ None ❒ Elementary school
❒ High school ❒ Higher education

Household size ❒ 1 ❒ 2 ❒ 3 ❒ 4 ❒ 5 ❒ 6 ❒ 7 ❒ 8 or more

Number of families in household ❒ 1 ❒ 2 ❒ 3 or more

Home, owned / rented: ❒ Yes ❒ No

Dwelling area ❒50 sq.m or less ❒ 50-75sq.m ❒ 75-100sq.m ❒ 100-150sq.m ❒over 150sq.m

No of rooms: Bedrooms: .... Toilets:.... Kitchens:..... Living rooms:.... Diningroom:...

Land ownership: ❒ family owned ❒ state owned ❒ owned by owners of apartments

How long have you lived here: ……..

Preliminary Open Ended Questions:
1- Identify 5 positive and 5 negative aspects about your daily life:

2- Identify 5 positive and 5 negative aspects about your neighbourhood

3- Identify 5 positive and 5 negative aspects about you're the settlement as a whole

Closed ended- questions

Why do you choose to live here
- ❒ Because of work
- ❒ Your family has always lived here
- ❒ You like the place
- ❒ Good in price

If not listed please give the reason, ...
.....

House Satisfaction: Evaluate the following
1- House Ventilation
❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

2- Summer overheating
❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

3- Winter cold
❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

4- Natural light

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

5- Sound insulation

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

6- Spatial distribution

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

7- Privacy

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

8- Rate from 1-10 the following

a- Internal sanitation system ……..
b- Internal water supply system ……..
c- Internal electrical wiring ……..
d- Building structure ……..
e- Internal finishing ……..
f- Home appearance ……..
g- Home identity ……..

9- How would you rate your overall satisfaction with your home?

❒ Very dissatisfied ❒ Dissatisfied ❒ Neither dissatisfied nor satisfied
❒ Satisfied ❒ Very Satisfied

f) Neighbourhood satisfaction: Evaluate The following

1- Sense of security in the neighbourhood

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

2- Tranquillity

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

3- Social Interaction

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

4- Cleanliness and maintenance of the neighbourhood environment in relation to government housing

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

5- Air pollution?

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

6- How would you rate safety for children playing?

❒ 0-20 /100 ❒ 20-40 /100 ❒ 40-60 /100 ❒ 60-80 /100 ❒ 80-100 /100

7- How would you rate your overall all satisfaction with your neighbourhood?

❒ Very dissatisfied ❒ Dissatisfied ❒ Neither dissatisfied nor satisfied
❒ Satisfied ❒ Very Satisfied

8- Rate from 1-10 the following

a- Sewage system ……..
b- water supply system ……..
c- electricity infrastructure ……..
d- neighbourhood appearance ……..

Transport

7- From 0-100 % what percentage do you use the following to get your daily needs

Walk ..... Bike ..... Bus ..... Car .....

8- Which mode of transport do you usually use to go to work?

❒Walk ❒Bike ❒Bus ❒Car

9- Where do u live in relation to your place of work?

- ❒ Work and live in the same neighbourhood
- ❒ Work close to home
- ❒ Work in the same area within walking distance
- ❒ Take one ride to go to work
- ❒ Take more than one ride to go to work

appearance

10- How would you rate your contact with green areas?

❒ A lot of contact ❒ Sufficient ❒ Average
❒ Insufficient ❒ Non at all

11- How do you feel about the appearance of your dwelling?

❒ Very Unattractive ❒ Unattractive ❒ neither unattractive nor attractive
❒ Attractive ❒ Very attractive

12- How do you feel generally about your neighbourhood?

❒ dislike very much ❒ dislike ❒ neither dislike nor like
❒ like it ❒ like very much

13- Do local residents congregate, and are there enough places close by for people to meet?

❒ yes ❒ no

.....
.....
.....
.....

14- Rate the following on a scale from 1-10

Shade and sunlight in the street environment .....
Crowding .....

Sustainability

1- Would you prefer:

- ❒ Residential quarters to be separated from any other land use.
- ❒ Residential quarters to be separated from everything except small shops.
- ❒ Residential quarters to mix with commercial activity, but not with production activity.
- ❒ Residential quarters to mix with everything except pollusive uses
- ❒ Residential quarters to mix with everything.

Is it possible for the local community to agree and regulate what use permitted and what not.

❒ yes ❒ no

2- How satisfied are you with current street widths`?

❒ Very dissatisfied ❒ Dissatisfied ❒ Neither dissatisfied nor satisfied
❒ Satisfied ❒ Very Satisfied

3- How satisfied are you with transport to reach needs and work?

❒ Very dissatisfied ❒ Dissatisfied ❒ Neither dissatisfied nor satisfied
❒ Satisfied ❒ Very Satisfied

4- How satisfied are you with the density of the urban pattern?

❒ Very dissatisfied ❒ Dissatisfied ❒ Neither dissatisfied nor satisfied
❒ Satisfied ❒ Very Satisfied

5- How satisfied are with the local building system and methods?

❒ Very dissatisfied ❒ Dissatisfied ❒ Neither dissatisfied nor satisfied
❒ Satisfied ❒ Very Satisfied

Measurement of Autonomy & Community Control

Community Order System

1- How much control does local or central government exert on local building process?

❒ Far too much ❒ Too much ❒ Appropriate amount ❒ Little ❒ Too little

is this suitable to you?

❒ yes ❒ no

2- How much control does local or central government exert on making alterations to buildings?

❒ Far too much ❒ Too much ❒ Appropriate amount ❒ Little ❒ Too little

is this suitable to you?

❒ yes ❒ no

3-How do you rate the importance of being able to make alterations to your home?

❒ very important ❒ important ❒ not important ❒ not important at all

4-How difficult is it to make structural and design changes to your home?

❒ very difficult ❒ difficult ❒ possible ❒ easy ❒very easy

5- Do you have the ability to make internal alterations in your dwelling (walls)? ❒Yes ❒No

If not want prevents you? .....

Do you have the ability to extend your for increasing area? ❒Yes ❒No

If not want prevents you? .....

Where and how are you able to make alterations?.....

6 -Would you like more responsibility and control over building to be in the hands of owners and local community? give reasons.

❒ Yes ❒ No

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7- How would you propose increasing local control?

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8- Is their a local community system that controls how buildings are made and altered in relation to each other?

❒ Yes ❒ No

If yes what are these norms? And how does the system work?

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9- What would you prefer ?

- ❒ This system to replace the government system?
- ❒ More authority to the local community than that of government?
- ❒ More authority to government than local community?
- ❒ Only government authority?

10- Are there local norms concerning what is permitted in the street and what is not (weather maintenance, structure changes, or street cleanliness), or is it controlled by a central authority? and what is allowed or disallowed in each case (weather local norms or authority controls). ❒ Yes ❒ No

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11- Does the community sometimes initiate maintenance or short term repairs over electricity, water, or sewage infrastructures in any way? And which and what is the nature of such maintenance?

Electricity: ❒ Yes ❒ No

.....

Water supply: ❒ Yes ❒ No

.....

Sewage ❒ Yes ❒ No

.....

12-Who maintains the infrastructure more?

1) Only the local authority ❒
2) The local authority more than the community ❒
3) The local authority and the community equally ❒
4) The local community more than local authority ❒
5) The local community more ❒

13-Is this a satisfactory situation, should the community or authorities do more and why?

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14-What do you think the effect of organic growth urban form?

❒ creates very good urban form ❒ good urban form ❒ nor affect
❒ creates bad urban form ❒ very bad urban form

15-Is the central mosque maintained and kept by the local community or the authority?

❒ Yes ❒ No

Are there other central facilities maintained by the community e.g. squares or schools and would you like the responsibility kept in the community?

.....

❒ Yes ❒ No

16-Is there a system of elders that the community entrust to with community action for the central facilities or any disputes regarding the built environment?

❒ Yes ❒ No

Is this acceptable to you?

❒ Yes ❒ No

Control of the built form of the economic activity

1- Can you get your basic needs close by?
❒ I can get all my needs close by
❒ I can get most of my needs close by
❒ I can get some needs close by
❒ I get most of my needs from far away
❒ I get all my needs from far away

3- Are there local norms that govern the built form of the economic activity?

4- Is there common knowledge of what is permitted by the economic activity and what is not?

5- What are the general guidlines of what is allowed and what is not?
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6- Do you agree mixed land use is a good idea?
❒ I agree fully ❒ I agree ❒ I disagree ❒ I disagree fully

Self-reliance in knowledge and technology

1- How was your house built?
❒ built it entirely on your own
❒ with help of family members
❒ built part and part hire the local labour
❒ hire a contractor
❒ bought it from a previous owner
❒ bought it from the government

2- Would you prefer to
❒ build it entirely on your own or with help of members (self-build)
❒ build some parts with some help of local labour
❒ hire a contractor
❒ from a previous owner
❒ to buy from government housing

3- Do you think it is better for you to design your dwelling without an architect?
❒ I agree fully ❒ I agree ❒ I disagree ❒ I disagree fully

4- Do you think you need a structural engineer when building?
❒ I agree fully ❒ I agree ❒ I disagree ❒ I disagree fully

5- Do you think that the local community has the ability to manage and be responsible for local water and waste water infrastructures?
❒ yes ❒ no
If yes how much responsibility do you think they should have?
❒ full responsibility ❒ more responsibility than local authority
❒ some responsibility ❒ minimal responsibility

6- Do you have any suggestions on how to give responsibility to the local community?
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Evaluation of community cohesion

1- How would you describe the relationship with your neighbours?

❒ Look Unfamiliar ❒ Look Familiar ❒ say hello
❒ Know by Name ❒ Visit and Talk

2- How far do you know your neighbours?

❒ None ❒ Only next door neighbours ❒ Only this building
❒ The street ❒ The whole neighbourhood

3- How much do you think the local community communicates to solve common problems or for the common interest?

❒ Never ❒ only when there are serious problems ❒ often communicate
❒ always

4- Is there a good relationship between the individuals of the neighbourhood?

❒ Very bad ❒ Bad ❒ Average ❒ Good ❒ Very good

5- Are there many local extended families?

❒ yes ❒ no

has your family always lived here?

❒ yes ❒ no

Make suggestions on how to improve the settlement in which you live.

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